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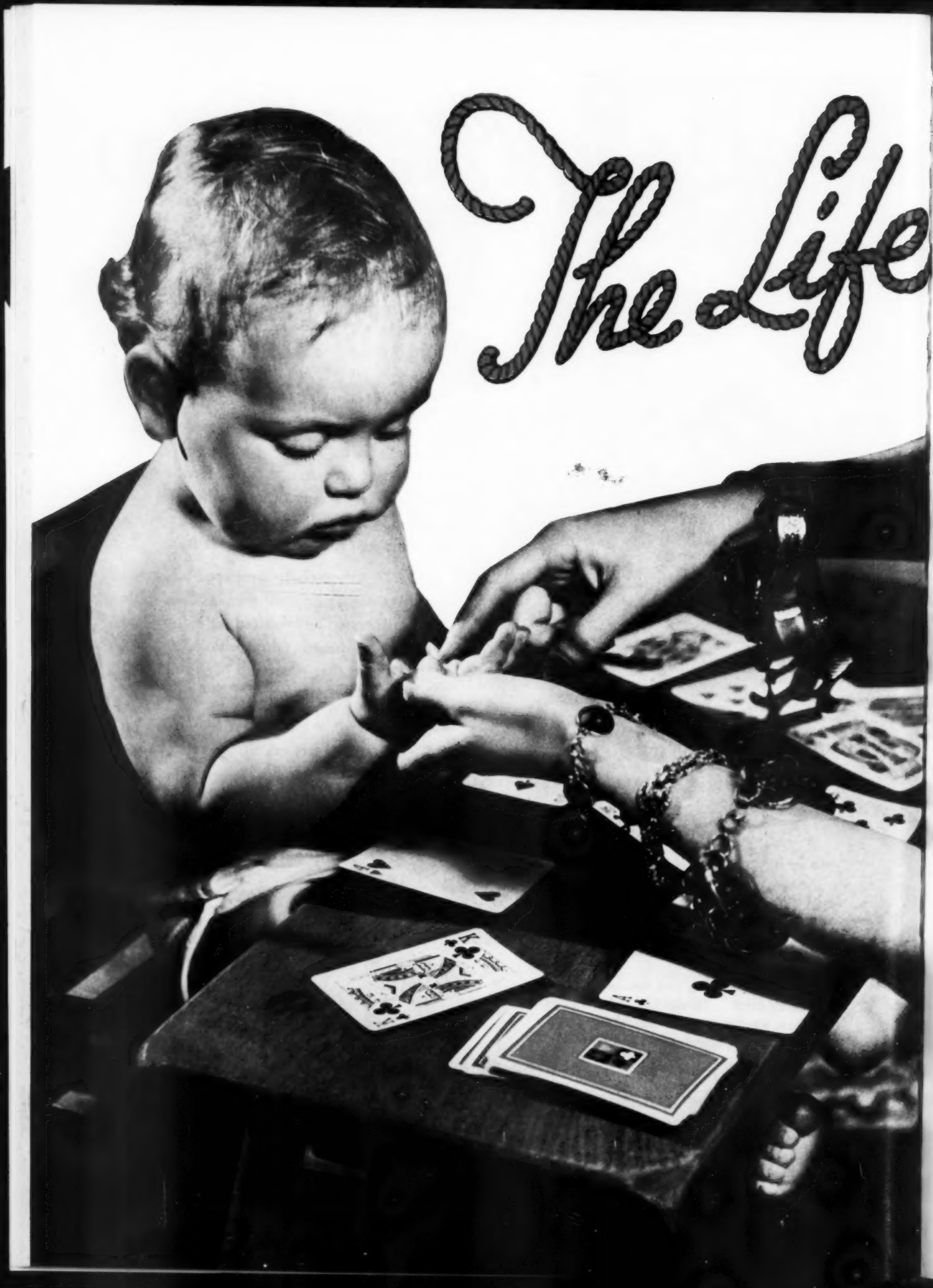
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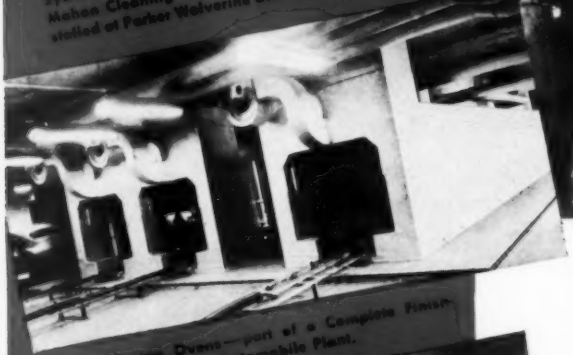
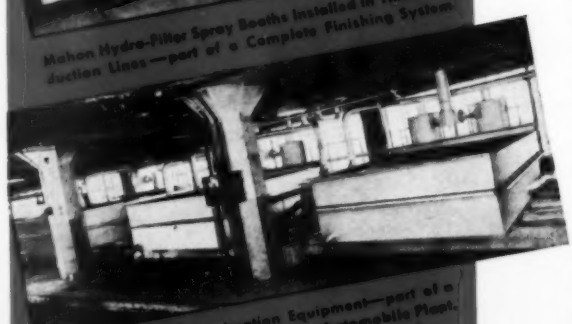
Above: Mahon Metal Cleaning and Rust Proofing Equipment—part of a Complete Finishing System in a Large Automobile Plant. At right: Mahon Cleaning and Rust Proofing System installed at Parker Wolverine Div. of Udilyte Corp.



Mahon Drying Ovens—part of a Complete Finishing System in a Large Automobile Plant.

Mahon Hydro-Filter Spray Booths installed in Three Production Lines—part of a Complete Finishing System.



Mahon Overspray Reclaimation Equipment—part of a Complete Finishing System in a Large Automobile Plant.

## *Production Equipment Engineered to YOUR Specific Requirements*

The illustrations on this page show Mahon Finishing Equipment in operation—complete from Metal Cleaning and Rust Proofing through Drying, Spraying and Baking to Overspray Reclaimation Equipment . . . this equipment is in the automotive industry where fine finishes are imperative. In other industries too—industries all over the world, where finishing constitutes a major production operation—you will find Mahon Complete Finishing Systems. Over twenty-five years of pioneering in this highly specialized field, involving constant research and development, have endowed Mahon engineers with a wealth of technical knowledge and practical know-how not available to you elsewhere. If you are contemplating a new modern Finishing System, or changes in present equipment, call in Mahon engineers—consultation will not place you under obligation.

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# MAHON

# THE Finish Line

**ARE YOU SICK OF SHODDY MERCHANDISE? —** If you are, you can bank on it that you have plenty of company. That long awaited white shirt which gives up the ghost after the second laundering — that suit which you wouldn't wear to a fire sale (value $20 — present selling price, special bargain, $90) — sheet metal products made of such light gauge metal that a good squeeze would crush them, *and* "finished" with materials which resist rust only temporarily — products of wood for the home, "constructed" of lumber which wouldn't make respectable crating — these are a few examples and we could go on endlessly, but the point has been made — there is a lot of junk being offered by retail sales outlets.

There is no intent to place the responsibility for this situation. From the manufacturing viewpoint, much of the "cheap" merchandise turned out may be attributed to unavoidable shortages of the right raw materials, the critical labor situation, or, in some cases, just plain willingness to take advantage of a situation and get the most in cash return for the least in actual value delivered.

The retailer will in many cases bear the brunt of public resentment. Here the reason may be the impossibility of stocking sufficient standard quality merchandise to stay in business — or, in some cases, it may be the willingness to join the "get rich quickers" who learned their A, B, C's of money making during the war.

The condition is here, regardless of the responsibility.

### There are signs to be read

Reports from recent trade shows and wholesale markets indicate that those who buy and those who sell both have a picture of the situation, and the effect has been a strong tendency to conservative buying. Those who must buy *now* for resale *later* are extremely reticent about stocking "just anything" because there is a ready market. These buyers have felt the public pulse, and the signs point to a "slow down" among retail buyers if they are to be offered $10 articles for $20, and then get junk.

It is the opinion of some that while accelerating prices may have a profound effect on sales volume, the real resentment of the retail buyers results from the attempt to palm off "cheap" merchandise. Many would gladly pay higher prices *if* they could get good "old-fashioned" quality.

### Not so true in "durable goods"

We believe that the majority of major appliance manufacturers have anticipated this trend and have attempted to hold the quality line in product design. In fact, it can be safely anticipated that many of the 1947 appliances will not only match old-time quality, but will offer many new features and refinements in addition.

Another point, too. The price increases for appliances to date have been quite modest compared to many of the increases that have been common to foods, clothing and other items.

### The trend is good for porcelain enamel

If the signs are accurate, and the future buyer will look for quality first, then price — and demand "reasonable value" before he buys — the result should be entirely favorable to our industry.

Porcelain enamel is synonymous with quality in appliances and other metal products, and increasing thousands of buyers have come to recognize this fact during the "do without new products" years. Many of these buyers now know the one and only finish which can be depended upon for the lifetime of the product.

### A special note to "new product" makers

There are a number of new products such as cabinet dishwashers, water heaters, frozen food lockers, automatic washing machines, ironers, etc., that have been designed to fit readily into the modern kitchen — with tops at standard cabinet height.

Some of these are finished with ordinary finishes despite the fact that their design invites their use as work tables.

In some cases this improper use of less durable finishes may be the result of failure to obtain sufficient supplies of enameling grade steel, but in any case it won't take the homemaker long to find the weakness in the product — a weakness that may reflect unfairly to the discredit of the product as a whole.

Some manufacturers have insisted on supplying *only* tops of porcelain enamel. We point to this as a smart decision, and predict a quick swing to porcelain enameled tops as standard for all appliances designed for use in the kitchen *at work cabinet height.*

Dana Chase

EDITOR AND PUBLISHER

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# The fabrication and porcelain enameling of formed metal plumbing ware

*By J. W. Sampson* • PRODUCTION MANAGER, AND
*S. E. Hemsteger* • CERAMIC ENGINEER, BRIGGS MANUFACTURING CO., DETROIT, MICHIGAN

(read the plant story and then see the colorful result on page 30)

finish

It is common to think of Detroit as the center of automotive production, but less commonly realized that many of the mass production methods developed and perfected by this industry, together with the industry's research, have also contributed to the introduction of new materials and improved methods in the production of products unrelated to the automobile.

When Briggs' designers and engineers were probing the consumer product field in search of new and better ways to make consumer goods and at the same time furnish the means of diversifying its own position, thus overcoming the valleys and lay-offs when models were changed in the production of automobile bodies, it was only natural that they chose the field where their facilities to form metal could be utilized.

The post-war planning for production facilities of the Plumbing Ware Division naturally undertook to satisfy both the normal growth period requirements and an accelerated demand from a starved building industry.

This entailed a complete streamlining of all phases of production to more closely approach what nominally comes under the heading of *mass production.*

## FABRICATION

Any straight line porcelain enamel production requires a steady supply of raw metal shapes—in our case—plumbing fixtures. These units include bathtubs, lavatories and kitchen sinks in a range of sizes and shapes.

Two press lines are devoted to drawing or forming the various fixtures. They include a battery of hydraulic and mechanical presses, ranging from 50 to 1500 tons. Large shapes such as bathtubs and drainboard sinks move down one line which boasts some of the largest presses of their kind. The second line of presses, comprising smaller units, is devoted to drawing such fixtures as lavatories and flat rim sinks.

### Motorized rubber rollers apply drawing compound

The bathtub, as are all other fixtures, is drawn from a 14 gauge sheet of special enameling iron with properties of ductility that permit the required deep draws. The bathtub sheet size is 63″ x 82″. Before being placed on the bed plate for the sump draw, the sheet travels through motorized rubber rollers, where a uniform thickness of drawing compound is rolled on both surfaces.

The dies which draw the sump of the bathtub weigh 45 tons and a pressure of approximately 1500 tons can be exerted by the press. After the sump is drawn, the fixture moves on a conveyor to a second press of equal size, the dies in which give the bathtub its "safety bottom" — parallel serrations or embossings that minimize the dangers of slipping when used by the bather.

Following this operation the fixture moves down the press line on conveyors and receives the following progressive operations: trimming of excess metal, flanging of the 1″ integral tiling strip, flanging of the roll rim of the bathtub, and piercing of the overflow and outlet drains.

Of at least equal interest to the development of the bathtub with its deep draw is the double draw of the two-compartment sinks. At first it was considered necessary to draw the two sink sumps separately and join by welding. Now all sinks of this type have both sumps stamped from a single sheet.

### Primary cleaning precedes metal finishing and welding operations

A primary cleaning of all drawn fixtures previous to metal finish is done in a pickle room maintained especially for this purpose. The drawing compound residue on the drawn fixtures is removed in immersion type cleaner tanks, and acid bath follows to remove any surface oxidation. Whenever it is necessary to store the drawn fixtures, this primary pickle is by-passed until the fixtures are placed in the production system.

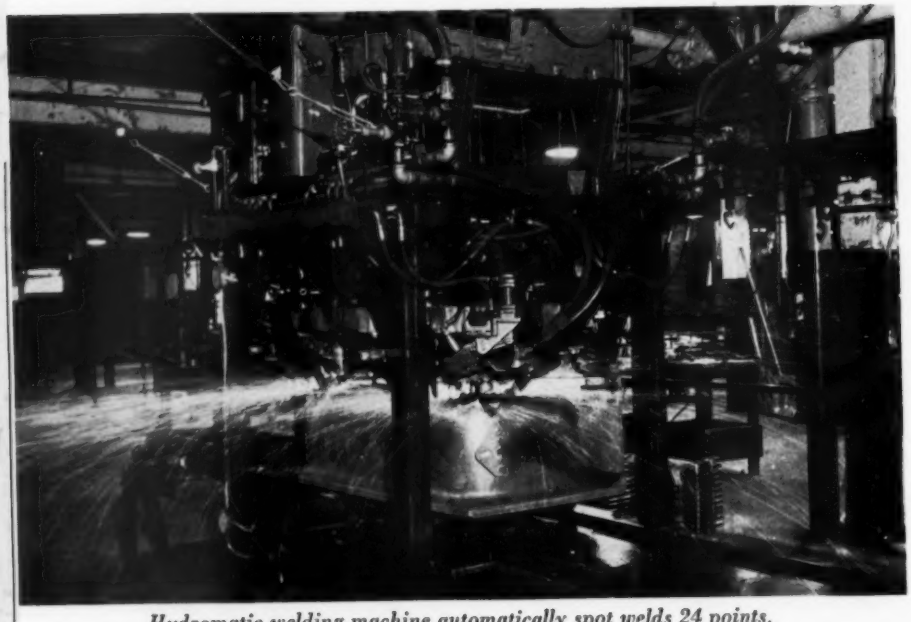
Because of close tolerance maintained in die design, it is necessary to do only a minimum amount of actual metal finish as such. The principal operations in this department are concerned with welding together the component parts of the various fixtures. The apron of the bathtub is spot welded to the drawn sump and connected by braces at the lower corners to an "H" member or cradle that is welded to the tub bottom.

This "H" member is spot welded automatically in 24 fixed locations in a Briggs designed hydromatic welding machine. The "H" member provides a positive means of compensating for the slope of the bathtub bottom and permits the tub to rest on the floor without additional supports or bracing when installed on the job.

### Welded hanger brackets provided for firing supports

Another important welding operation in this department is affixing

*This photo shows welding operation for joining the tub and apron.*



*Hydromatic welding machine automatically spot welds 24 points.*

*Basket of double compartment sinks on trip through the pickle room.*

furnace hanger brackets which are needed to suspend the various fixtures in the furnace at the time the ware is fired. The assembled units then travel by conveyor to the pickle room to be prepared for porcelain enameling.

**Pickle room has automatic temperature regulators and recorders**

Placed in specially designed baskets, the fixtures are handled by electric hoists from one to another of the various immersion tanks that make up the pickle cycle.

Steps in the pickle process are:

| | | |
|---|---|---|
| 1. | Alkali Cleaner | 210° F. |
| 2. | 2 Rinse (Water) | 210° F. |
| 3. | 7% Sulphuric Acid | 140° F. |
| 4. | Rinse | Tap Temperature |
| 5. | Nickel | 165° F. |
| 6. | Rinse (Water) | 160° F. |
| 7. | Borax, Soda Ash Neutralizer | 200° F. |
| 8. | Air Dry | |

In view of the heavy gauge of the fixtures, sufficient entrained heat is accumulated during the various pickle immersions to permit air drying of the fixtures after the final neutralizer bath.

Safety for pickle operators is provided by introducing fresh air on the operator's side of the pickle tanks and exhausting on the opposite side.

Tank construction varies from steel for water and the neutralizer, to vitreous brick in the case of acid, and wood for the nickel bath.

In addition to the automatic temperature regulators and temperature recorders that maintain constant checks on both acid and nickel solutions, an electric timing device is employed to regulate the time the ware remains in the nickel bath.

After the ware is taken from the neutralizer, it is again placed on conveyors for its final operation—porcelain enameling.

**PORCELAIN ENAMELING**

To expedite efficient mill charging, frit and raw materials are stored on the floor immediately above the mill room. Conveniently placed hatch covered *porcelain enameled hoppers and chutes* are spaced on the floor following the pattern of the mill locations on the floor below. In this

manner, after the batches of frit are weighed in *porcelain enameled batch carts* the charges are unloaded directly into the chutes feeding the mills which are on the schedule for charging.

The mill room is equipped with a battery of 10 mills ranging in size from 150 lbs. to 4000 lbs. capacity. Before unloading any of the mills, the porcelain enamel is checked for fineness and a burned trial run in the lab. Upon being OK'd by the lab, the milled porcelain enamel is fed by gravity into a hopper funnel to a Moyno pump by which it is pumped up into a series of wooden overhead storage tanks of 250 and 500 gallon capacity.

### Milled enamel storage containers and ground coat recirculation system are porcelain enameled

Each tank is equipped with a motor drive agitator, thereby permitting the porcelain enamel to remain in a perfect mix, until, and again by gravity, it passes through a Rotospray and Electromagnet into 60 gallon spray booth pressure service tanks or in 70 gallon *porcelain enameled storage containers.*

Before using, the porcelain enamel in the storage containers is mixed thoroughly, checked to correct specific gravity for spraying or dipping, and then transferred to the pressure tank or dipping tank.

Ground coat spraying is done from a large 400 gallon stainless steel pressure tank. The ground coat porcelain enamel is prepared in the mill room and then pumped over to the spray booth into this large service tank. Ground coat dipping of small ware is done in a tank which has a water cooling coil and a *porcelain enameled recirculating system* to keep the porcelain enamel in good condition while the ware is being dipped.

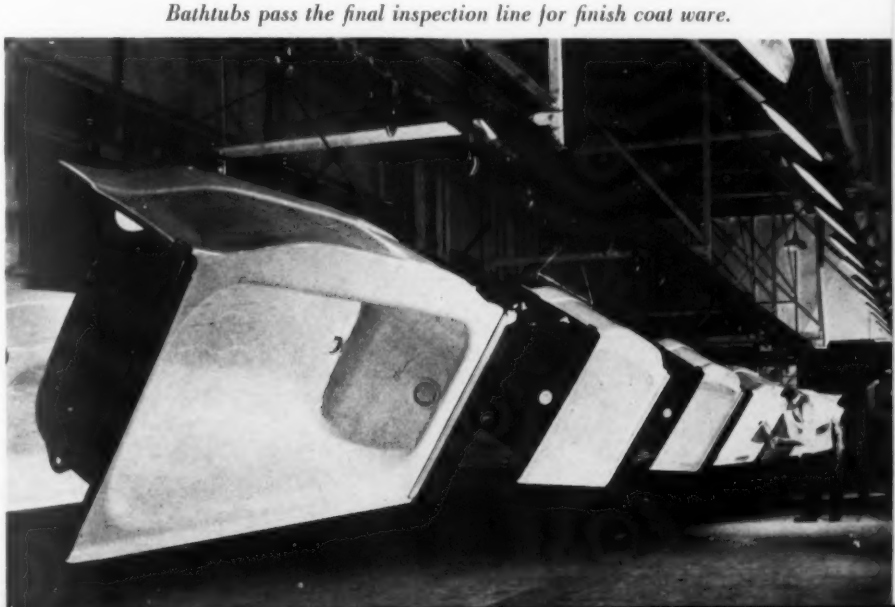
### Spray booths and driers for large scale production

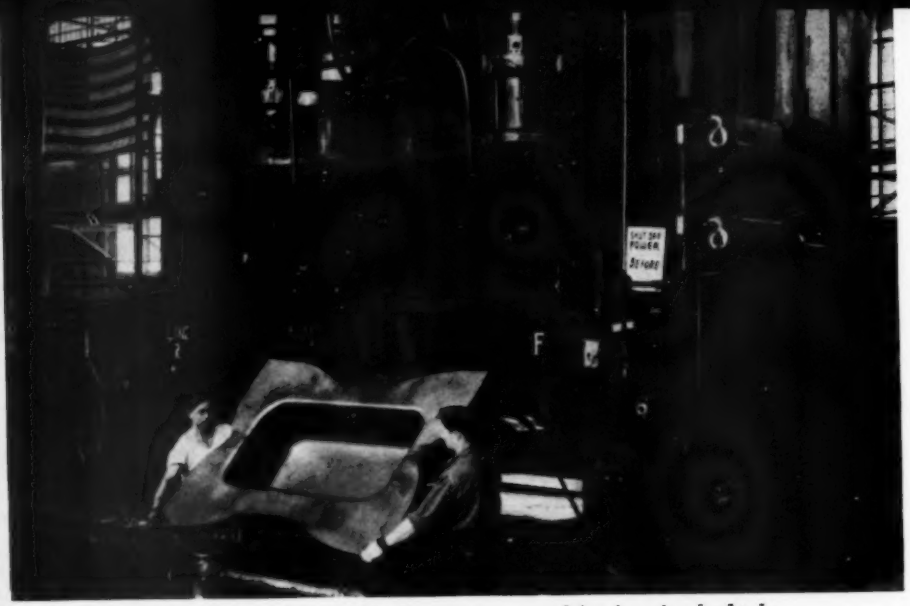
There are two ground coat spray booths of the water wash type. The ware is sprayed as it passes through the booths on the conveyors. Temperature controlled air is supplied to the spray booths to secure as clear an atmospheric condition as

*One of three 50' cover coat spray booths. Note "air conditioned" hoods.*

*One of three large continuous furnaces for firing the plumbing ware.*

*Bathtubs pass the final inspection line for finish coat ware.*

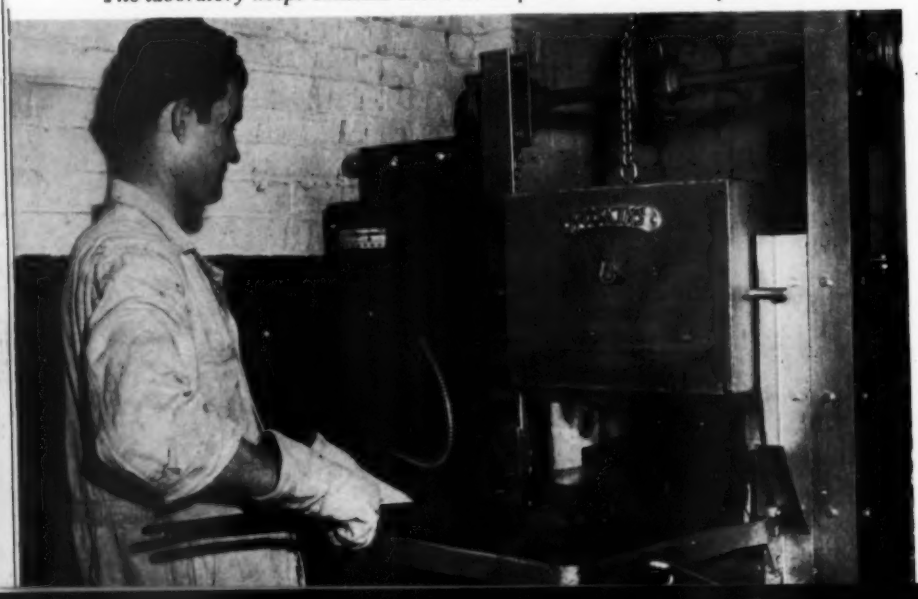




*Sectional view of one of the large presses used for forming bathtubs.*

*Slip passes through sieve and magnetic separator into ground coated tanks.*

*The laboratory keeps constant check on all production batches of enamel.*



possible. Then, instead of the usual style of respirator, the spray operators wear hoods to which fresh filtered and temperature controlled air is fed. The hoods and air treatment system were developed by Briggs.

The water wash type spray booths are approximately 45 feet in length and immediately adjoining is a tunnel drier 120 feet long. This drier is heated by forced hot air through jets from a unit steam heater.

Cover coat spray booths are three in number, are 50 feet in length, and are also of the water wash type. Air is supplied to these booths and to the sprayers in the same manner as in the ground coat spray lines.

Cover coat driers for this battery of spray booths are 150 feet in length and are heated by steam coils.

### Pre-application inspection

As in every operation, inspection plays an important part in the production picture. In the spray department the ware is inspected before the application of each porcelain enamel coat, this inspection point being just outside each spray booth.

Certain areas of each fixture must be brushed, usually around the faucet or supply openings, and this is done immediately after the fixture emerges from the driers. The fixture then is taken from the spray conveyor and transferred to the furnace conveyor lines.

### Three continuous furnaces

As pointed out earlier in this article, with the exception of the smallest lavatories, fixtures are hung on the furnace conveyor by means of hanger brackets welded to each unit in the metal finish department.

All burning is done in three gas-fired, straight-through continuous furnaces where the temperature is maintained at approximately 1550° F. The furnaces are automatically controlled, having recording potentiometer, draft gauges and $CO_2$ recorders.

### Falling ware accidents prevented by "electric eye"

As a safety precaution, each furnace has an "electric eye" apparatus,

*to Page 30 →*

# Welding sheet metal for enameling

## covering five discussion topics of importance to successful welding

*By Orville T. Barnett* · DIVISION ENGINEER, ELECTRODE DIVISION, METAL & THERMIT CORP., N. Y., N. Y.

finish Arc welding offers an inexpensive means of fabricating sheet metal prior to enameling, despite the fact that some enamelers have experienced spalling of the enamel in the welded area. In this paper two separate approaches will be suggested for eliminating the spalling of enamels while other welding problems related to low cost sheet metal work will be discussed.

A divergence of opinion exists as to what thicknesses of steel should be classified as sheet metal, with some engineers considering every thickness from 24 gauge to ¼" as properly falling into the sheet metal category. For metallic arc welding, however, sheet metal limits ranging from 18 gauge up to 10 gauge appear to be most practical, and therefore this article will be limited to this gauge range.

In Table I, two popular standards of decimal equivalents for gauge numbers are listed.

**Table I**

**Accepted decimal equivalents of standard gauge numbers**

| *Gauge No.* | *U.S. Standard Gauge* | *Birmingham Wire Gauge* |
|---|---|---|
| 10 | 0.1379 | 0.134 |
| 12 | 0.1072 | 0.109 |
| 14 | 0.0766 | 0.083 |
| 16 | 0.0613 | 0.065 |
| 18 | 0.0490 | 0.049 |

Any logical analysis of sheet metal welding activities in the porcelain enameling field suggests five topics for discussion:

1. Relationship between fit-up and joint design
2. Influence of positions of welding on cost
3. Use of jigs and fixtures
4. Selection of electrodes, current and technique
5. Preparation for enameling

The first four points merit study in connection with any welding activity, but sheet metal fabrication changes the relationship of some of the factors involved. The fifth point is peculiar to enameling requirements.

### Relationship between fit-up and joint design

Because of the comparatively slight heat capacity of sheet metal joints, fit-up becomes important. The welding joints shown in Figure 1 are predominantly those that permit easy fit-up. Only one of the six joints pictured, the butt joint, presents a difficult fit-up problem. Butt joints are for this reason used sparingly in sheet metal weldments.

Improper fit-up means that there is a gap or opening in the joint. Gaps create draft or arc blow, thereby interfering with the welder's control over his arc. Even more troublesome is the pronounced reduction in an already limited heat capacity. Greatly reduced welding current, smaller diameter electrodes and slower travel speeds are the only recourse when gaps occur. Otherwise the arc "burns through." When this happens, the welder must stop and laboriously repair the defect. Such repairs are wasteful of time and material, and the resulting weld is frequently of lower quality.

Both lap welds and corner welds provide a means for attaining good fit-up. The welder uses a ball peen hammer to bring the two parts into contact and secures the fit by means of a tack weld. Joint designs with a flange, lap weld A, edge weld B or combination lap and fillet weld C are the easiest to fit. Corner welds, outside such as D, or inside such as E, are more difficult to fit. And, finally, the butt weld F is the most difficult to fit unless the edges are square.

Experienced sheet metal welders use tack welds generously. Frequency of tack spacing may be a minimum

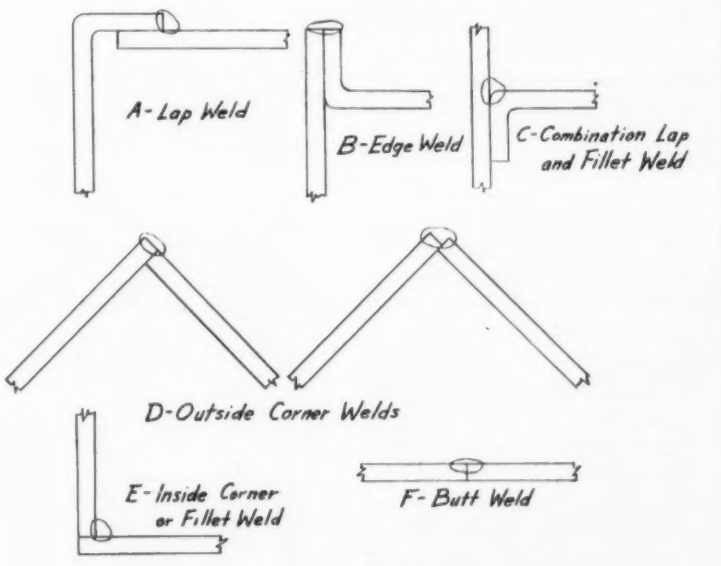



FIGURE 1. *Typical joint designs for sheet metal welding.*

of 3" when sheet metal joints are welded without the benefit of jigs and fixtures. Too many tacks are to be preferred over too few. In addition to bettering fit-up, since sheet metal warps quite readily, tack welds hold the parts in good alignment throughout the welding operation.

Figure 2 is a picture graph utilizing 12" rulers to point out the further role of joint design as it affects welding speed. Assuming perfect fit-up throughout and welding downhill at approximately a 45° slope, the edge weld is completed at nearly four times the speed possible with an inside corner weld. The five types of joints reported reflect the heat capacity of each in terms of possible travel speeds.

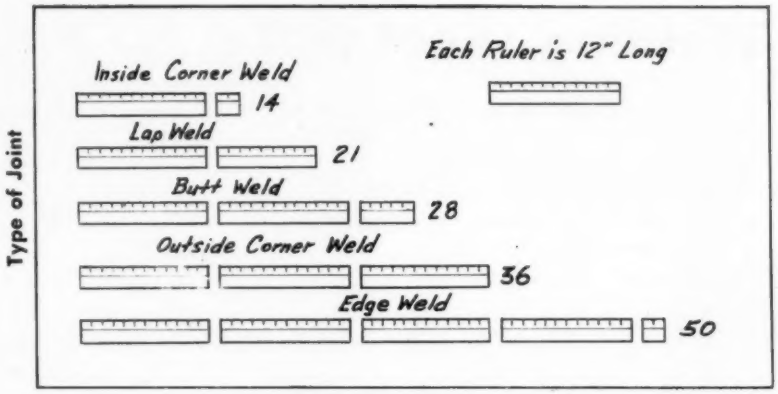



FIGURE 2. *Joint designs with good fit-up affect welding speed.*

### Influence of positions of welding on cost

In heavy fabrication, emphasis is placed on positioning the work so that welding can be done in the flat position. Another suggestion for the joining of thicker structures by arc welding is to weld from the bottom to the top when making vertical welds. In this way welds of better quality are usually possible.

Sheet metal fabrication, however, as Figure 3 clearly demonstrates, has rules of its own. The vertical position, not the flat position, results in the greater welding speed. Welding direction rather than being from bottom to top, is in the reverse direction. Cost is lowered and quality is improved by "vertical down" welding.

There is a difference of weld positions in sheet metal work as contrasted to other types of welding. In heavy work, for instance, the flat position is restricted to a maximum slope of 15° while this same position in sheet metal shops is anything up to 45° of slope.

Welding vertically down or flat with a pronounced downhill slope is the best practice. Greater welding currents can be controlled, and considerably more completed weld per manhour of welding effort will result. Horizontal fillet positions or flat positions without a slope are seldom used. In sheet metal welding, the overhead position is avoided.

### Use of jigs and fixtures

Properly designed jigs and fixtures help speed up the work and make better welds for several reasons: warpage is controlled, fewer tack welds are needed and the heat capacity of the joint is noticeably better.

Sheet metal parts tend to distort as a result of welding heat. While skip and step back welding procedures can be selected to minimize distortion a better way is to use combination jigs and strongbacks. Thus, the part is kept in good alignment during welding and held in shape until it has cooled. Subsequent heat treatments, such as that used to fire the porcelain enamel, do not disturb the established shapes. If warping is prevented initially, heating operations generally do not later upset the stress balance although internal stresses are reduced considerably.

Since the jigs and fixtures hold the component parts of a weldment in place for welding, fewer tack welds are needed. In some ingeniously devised holding fixtures, no tack welds at all are required. This elimination of tack welds saves time and material. It makes a more uniform weld possible as there are no humps from welding over tacks.

Jigs and fixtures, as diagrammed in Figure 4, can be faced with copper to increase the heat capacity of the joint. Since limited heat capacity is the greatest obstacle to rapid welding, the copper facing has a pronounced effect on lowering costs.

### Selection of electrodes, current and technique

Types and diameters of electrodes should be checked for sheet metal work. Most jobs can be welded with E6013 electrodes, about two-thirds of all sheet metal work being done with this AWS-ASTM grade. Other jobs are welded with E6010 and E6011

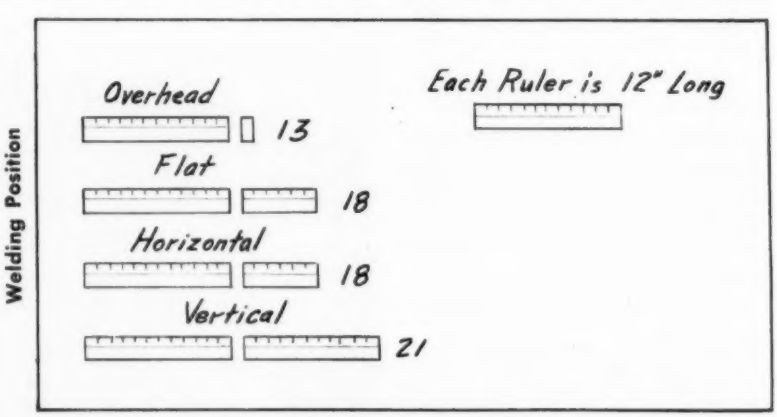
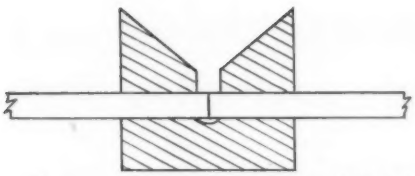



FIGURE 3. *Position of welding affects travel speed.*



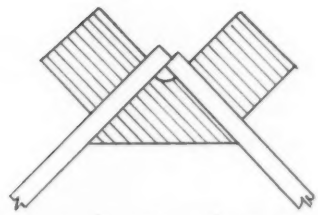




FIGURE 4. *Copper faced jigs and strongbacks increase heat capacities of sheet metal joints.*

electrodes. However, when the special problem of enameling is considered, E6015 lime ferritic electrodes offer definite advantages. This latter point will be considered in the section devoted to "preparation for enameling."

Sheet metal costs in some plants are too high because the work is done with electrodes that are too small and at currents that are too low. 1/16" and 5/64" electrodes, much to the surprise of some fabricators, can be replaced with 1/8" and 5/32" sizes when good fit-up and most advantageous joint designs prevail. For the gauges covered in this article 5/32" electrodes are the most popular, followed by 1/8", 3/16" and lastly 3/32". By choosing the larger diameter electrodes, and by utilizing higher currents, footages of finished welds have been as much as quadrupled over original practices.

Either alternating or direct current can be used with equal facility. Sheet metal electrodes must have pronounced arc stability, providing good alternating current utility. This same arc stability, used with direct current straight polarity (electrode negative), makes the welder's job much easier. For overhead welding, if this position *must* be selected, direct current reverse polarity may offer some advantage.

Fast travel with a short arc is the most accepted practice. If joints are hard to see, either extra illumination or guide strips, or both, will prove beneficial.

Drawback may occur when joints such as C and E of Figure 1 are located on the inside of a structure with enameling on the outside. When the right combination of electrode, current and travel speed is determined, sag or drawback will be well within the maximum of 10% considered to be the allowable limit.

Craters should be filled by correctly terminating the arc. This is accomplished by hesitating slightly or reversing the direction of travel at the end of run. Crater eliminators were developed during the war for light gauge welding in the aircraft industry. This device overcame defects associated with shallow or cracked craters.

### Preparation for enameling

Chipping and grinding of welds before porcelain enameling is accomplished by standard practices. Using vertical down welding with larger diameter electrodes at higher currents will deposit enough weld metal to fill without excessive crowning of the weld bead. The flatter bead thus formed reduces chipping and grinding labor.

Welds made with E6013, E6010 and E6011 electrodes contain considerable quantities of hydrogen gas. During enameling, particularly during the cooling cycle, this hydrogen may be liberated with resultant spalling of the enamel. Because E6015 electrodes produce weld deposits that are practically free of hydrogen, trouble with defective porcelain enamel over welded areas is eliminated. A sample welded panel prepared by a manufacturer who abandoned arc welding before he discovered the E6015 electrodes is shown in Figure 5. Of course, samples and actual production runs are often two different animals. Fortunately E6015 weld deposits have established a consistently fine record in production ap-

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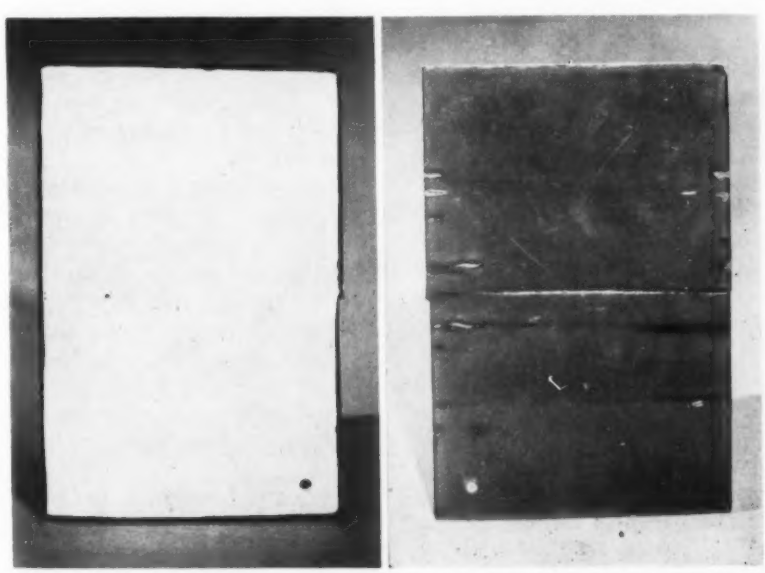

FIGURE 5. *Enameled test panel welded with E6015 lime ferritic electrodes. Left: Front view. Right: Rear view.*

# The importance of constant supervision in a porcelain enameling plant

## spotlighting an important problem in enameling plants, with case histories to illustrate

*By H. L. Cook* • O. HOMMEL COMPANY, PITTSBURGH, PA.

MUCH has been written and said about the technical and other phases of porcelain enameling. However, there is another side which is failing badly at the present time, and that is the human side. Since the success of enameling depends largely on the workmanship of employees, constant and vigorous supervision must be maintained at all times.

After the war, most enameling plants resumed operations with a minimum number of skilled employees and, in many cases, with newly created foremen. The results obtained generally throughout the country have not been highly successful. Since we have seen a few plants operating very well, we have analyzed the reasons. To us, it seems that these plants have had better and more constant supervision. The men in charge, their foremen and group leaders have kept on the move teaching employees and checking all phases of the enamcling operation.

### Examples of study cases

Now let us discuss a few cases. In one plant, before the war, they were getting an average of 85% of their ware in one coat. Before the war, this plant was poorly equipped. During the past year, the plant has been completely modernized, and anyone would call it a model plant today. Automatic spraying has replaced hand spraying; they now have modern pickling equipment so one would expect results to be at least the same. But they do not seem to be able to get over 60% of their ware in one coat.

The same enameling superintendent is still on the job, but he has lost a control man and a couple of foremen. This is quite a loss, but the handicap can be overcome. This superintendent has made his replacements with still able men but they lack knowledge and complete ability to supervise. As we see it, this superintendent does not spend enough of his time training his new supervision. He is assuming they are as good as his former men when actually they are not. He is overlooking the fact that until he gets his new men trained, he is going to have to do his job and part of theirs. That is tough on this particular superintendent, but that is the job he will have to do to keep his management happy, and his own job secure.

At another plant, the control set-up is very good, the supervision is for the most part the same, but the employees are largely new. The floor supervisors have a tough job; they are working hard, but they are prone to blame some of the difficulties they are having on enamel control when actually most of their troubles arise from faulty workmanship.

Hunting for alibis is a human trait, and we are as guilty as anyone in doing this. However, alibis will not solve our problems, so the supervisors at this plant will have to keep on working hard at their job of teaching and checking.

At a third plant, a foreman has become the enameling superintendent and he succeeded a man who was very successful. This man had excellent training as a foreman, but still he had many things to learn. He had to train new foremen, a new control man, and a high percentage of new employees. This particular superintendent has worked long hours. During these hours, he has been constantly on the job, teaching and supervising. The results at this plant are excellent, costs are low, production is high, and the quality is very satisfactory. This case merely proves that constant and vigorous supervision pays dividends.

### Employee training a "must"

The problem of employee training is endless at this time. Superintendents must train foremen and group leaders, and all supervisors must teach and train their workmen. There is a great deal of employee indifference today. We have been through some plants where people are interested in their work; they constantly watch their work and observe the results. In other plants, employee indifference is more noticeable, and it can be traced to supervisory indifference. The supervision has had a tough battle, and they have adopted the attitude that nothing more can be done. They are living in the past.

In past days when you had a poor employee, you got rid of him and got another. Today, you must try and improve the employees you have.

The supervisors' job is a tough one today, but it can be solved. The solution will not come out of an office. Today's supervisor must stay on his feet, and constantly get around to his men.

I once was present at a talk given by Charles F. Kettering, of General Motors, to a group of foremen. Mr. Kettering said he was in favor of having a small office for foremen, just small enough for one man, and then he would put a clerk in it. That is a tough attitude, but it just bears out the statement that to supervise successfully, you have to stay on your feet.

Years ago, I worked in the South at a fire-brick plant under Dr. A. F. Greaves-Walker, who was head of the Department of Ceramic Engineering

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# Ceramic coatings for steel

## in high temperature service

### their development, laboratory and service tests, and production experience

*By William N. Harrison, Dwight G. Moore and Joseph C. Richmond*
NATIONAL BUREAU OF STANDARDS, ENAMELED METALS SECTION, WASHINGTON, D.C.

THIS article describes a new type of ceramic coating for the protection of mild steels in high temperature service which was developed during the war at the National Bureau of Standards and was used by the Army and Navy on the exhaust systems of certain aircraft and other vehicles. The outstanding features of these coatings are: (a) high resistance to failure under repeated thermal shock, (b) protection of the metal against oxidation during prolonged exposure to temperatures up to about 1250°F., (c) freedom from the cracking and blistering produced in conventional porcelain enamels under comparable conditions of high temperature and severe thermal gradients, and (d) a mat surface which does not show highlights and, therefore, decreases the visibility.

### I • INTRODUCTION

Early in the war, supplies of many materials were inadequate to meet essential war demands. Nickel and chromium were particularly scarce because of the greatly increased demand and also because the normal importation of these metals was endangered.

To alleviate this situation, a project was undertaken at the National Bureau of Standards which included: (a) development of special heat-resistant ceramic coatings for low carbon steels, which could then be substituted for nickel-chrome steels in many applications, and (b) testing of the new coating in direct comparison with the conventional type of glossy porcelain enamels as exemplified by those used on the exhaust manifolds of some automobile engines.

Some of the new coatings gave superior test performance and were described in a report to the armed services dated June, 1943. This article comprises extracts from that report and supplementary information on service tests, compositions and the use of the coatings in production of parts for the armed services.

### II • DEVELOPMENT OF HIGH TEMPERATURE COATINGS

In order to avoid the necessity for extremely high smelting temperatures, conventional ground-coat frits were used, and refractoriness of the coatings was increased by mill additions. Zirconium oxide, titanium dioxide, ferric oxide, aluminum oxide, chromic oxide, silicon dioxide, silicon carbide, feldspar, mullite and chrome were added in various amounts, both singly and in combinations.

These coatings were milled, applied and fired by the methods used for porcelain enamels. The specimens were then examined for surface texture and adherence. Those that showed promise were heated for short periods at 1650°F in order to obtain an indication of their resistance to deterioration at high temperature. Of the various coatings tested, those containing alumina gave the best results.

It was found that the type of alumina used greatly influenced the properties of the coating. In general, alumina calcined at low temperatures produced the most desirable coatings, and A-1 alumina, as produced by the Aluminum Ore Co., was finally selected as well suited for the coatings in view of its properties and availability.

In the early development work, it was noted that alumina had a powerful effect in raising the resistance of the coatings to flow at elevated temperatures. To obtain more specific comparisons, a representative "hard" ground-coat frit was dry-ground to a fineness such that about one per cent was retained on a number 200

FIGURE 1. *Effect of 20% admixtures of various oxides on the fusion properties of a "hard" porcelain enamel ground-coat frit when prepared as cylinders 5/8 in. in diameter by 3/4 in. high and fired for 10 min. at 1600° F. Note sharp edges remaining on specimen containing alumina.*

sieve and, at the same time, a number of refractory admixtures were ground to approximately the same fineness. Mixtures were prepared from the resulting powders in the ratio of 80 per cent of frit to 20 per cent of oxide by weight, and cylinders 5/8 in. in diameter were dry-pressed. After drying, these cylinders were reduced to a uniform length of 3/4 in. The cylinders were fired for 10 minutes at 1600°F. then cooled slowly to room temperature.

Figure 1 shows the results of these tests. The frit (No. 11) with no addition fused to a button while the same frit with an admixture of 20 per cent by weight of A-1 alumina maintained its original sharp edges. The other oxide admixtures were not particularly effective in reducing the high temperature flow of the frit. The relatively large size of the buttons with chromic oxide and iron oxide admixtures was caused by a bubble structure and indicates a gas-forming reaction during the firing operation.

Four of the coatings prepared with A-1 alumina were outstanding in their effectiveness, appearance, adherence and ease of application.[1] The milled batches for these coatings (A-19, A-20 and A-55m) are given in Table I. The fourth coating, A-31, consisted of a thin application of a A-20 over a ground coat of A-19.

The following tabulation gives the coefficient of linear expansion per °C over the range of 25° - 400°C and also the interferometer softening temperature of frit No. 11 and of three coatings.

| Material | Expansivity 25° — 400°C | Interferometer Softening Temperatures | |
|---|---|---|---|
| Frit 11 | 9.6 x $10^{-6}$ | 531°C | 988°F |
| Coating A-55m | 9.6 | 560 | 1040 |
| Coating A-19 | 10.2 | 589 | 1092 |
| Coating A-20 | 10.3 | 592 | 1098 |

The thermal expansion is higher for the new coatings than for many ground-coat enamels. Experience has shown, however, that these new coatings should not be applied in as great a thickness as conventional ground-coat enamels because of a tendency of thick applications toward spontaneous fracturing, a defect which ordinarily indicates an excessively high residual stress between the coating and metal base. This higher residual stress in the ceramic coatings may be caused by the higher softening temperatures, resulting in a wider temperature range over which stress is introduced into the ceramic coatings during cooling.

All of the mat coatings prepared with A-1 alumina were somewhat porous, and it is believed that this porosity is responsible for the absence of reboil blisters when coated specimens are heated through the range 1050° to 1150°F. The reboil gases are apparently able to pass through these porous coatings without blistering while the imperviousness of the dense glossy types is such as to prevent the escape of these same gases without formation of blisters.

## III • LABORATORY TESTS OF COATINGS

Numerous laboratory tests were made on the coatings developed at the National Bureau of Standards as well as on conventional type coatings submitted for trial by a number of manufacturers. The laboratory test conditions were chosen to simulate operating conditions in airplane exhaust systems, especially stacks and collector rings of some motors without turbo-superchargers, and included the following: (a) flame-impingement test, (b) three types of thermal shock test (two very severe), (c) test for protection of metal against oxidation, and (d) test for the protection of metal against changes in properties caused by heating. The flame-impingement and thermal shock tests caused cracks in varying degrees in all the conventional type coatings and also produced reboiling in these coatings during the heating. The cracks occurred in patterns suggesting strain lines, and the reboiling tended to follow the cracks, but also

*[1]Because of the unusual properties of these coatings, application was made for a Government patent. This application was originally filed under the provisions of Revised Statute 4814, which served to keep the subject matter in a confidential category. At the end of the war the need for these restrictions no longer existed and the patent applications was released from this status in December, 1945.*

FIGURE 2. *Photograph of four coated steel exhaust stacks after 178 hours on a 1350 hp radial motor undergoing block test operation. Coating A-31 on the left is one of the special heat-resisting compositions, while C-9, C-1 and C-8 are three commercial coatings submitted for test.*

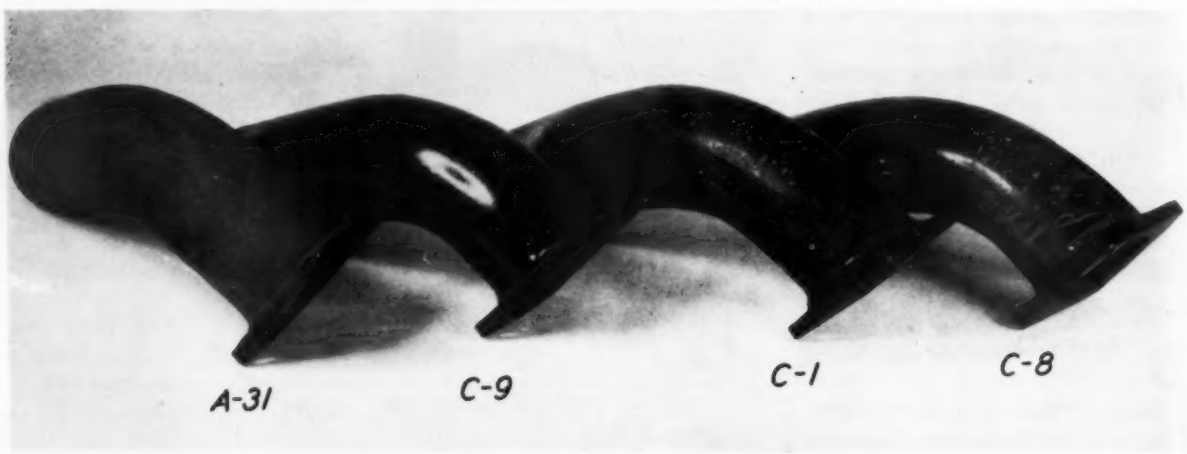

FIGURE 3. *Photograph showing condition of two coated steel exhaust stacks after 300 flying hours on a PBM-3D patrol bomber. Stack on left is protected with ceramic coating A-31 and is undamaged while stack on right, which is coated with commercial enamel C-1, shows scattered broken blisters and serious rusting at the resulting breaks in the coating.*

occurred in random distribution where there were no cracks. Neither defect occurred in ceramic coatings A-19 or A-31.

The coatings which showed the least reboil gave the best protection to the metal against oxidation, and also proved most effective in preventing loss in strength and the development of embrittlement.

## IV • SERVICE TESTS

A considerable number of exhaust stacks, coated at the National Bureau of Standards, were attached to motors and tested by the Philadelphia Naval Air Experiment Station, the Norfolk Naval Air Station, the Army Air Technical service Command at Wright Field, the Bell Aircraft Corporation, the Glenn L. Martin Co. and the Wright Aeronautical Corporation. Collector type exhaust systems were tested by or under supervision of the Army Ordnance Tank Automotive Center, the Navy Department Bureau of Aeronautics, the Aeronca Aircraft Corporation and the Grumman Aircraft Engineering Corporation.

One of the first sets of exhaust stacks to be tested is illustrated in Figure 2, which shows their condition after 178 hours of operation on a 1350 hp motor at the Naval Air Experiment Station in Philadelphia. Coating A-31 shows no effect from the treatment, while coatings C-9, C-1 and C-8 (all glossy ground coats) are damaged in varying degrees. Two types of defect are present on the damaged stacks. One is a series of cracks following a design apparently corresponding to the strain lines caused by temperature gradients. The second defect consists of reboil blisters, which broke and exposed the metal beneath. Such blisters have a tendency to segregate along the cracks. In areas where no cracks are formed they show no definite pattern. These defects closely resemble those found in the laboratory tests; in fact, there was excellent correlation between the several service tests and the laboratory tests.

Figure 3 shows two stacks after 300 flying hours on a Martin PBM-3D patrol bomber operating out of Norfolk, Va. The A-31 stack (on the left) is not visibly affected by the treatment, while the stack on the right coated with C-1 shows numerous broken blisters and serious rusting.

All the other service tests also showed the newly developed coatings to be superior to the conventional glossy coatings. In no case did the A-19 or A-31 coatings develop visible cracks or reboiling. Because A-19 is applied in one coat, while A-31 requires two, A-19 was recommended for exhaust stack applications. Where metal temperatures of 1250°F or slightly above are encountered, A-31 is recommended, but low carbon steels have so little strength at these temperatures that the uses are limited.

Figure 4 shows sections from two of a series of coated collector rings tested under the supervision of the Tank Automotive Center of the Army Service Forces. These collectors were attached to M-4 tank motors during dynamometer tests. The part on the left was coated with A-31 and had undergone 120 hours of operation. The other coating, which was one of the poorest, was a proprietary product of the glossy type and had been under test for 13.5 hours, or only about one-tenth as long as the specimen coated with A-31.

Proving ground tests were also made on ten collector rings, each of

FIGURE 4. *Sections of coated steel collector rings after operation on a 450 hp 9-cylinder Continental motor undergoing dynamometer tests. The part on the right which was protected with one of the poorest conventional enamel coatings has undergone 13.5 hours of test and shows pronounced fracturing and cracking of the coating. The part on the left is protected with ceramic coating A-31 and has undergone 120 hours of testing on the same motor without cracking or reboiling. The area within the circle was cleaned of grease and other external deposits, showing the undamaged coating beneath.*

which was protected with a different coating. One of these collector rings was coated with A-19 at the National Bureau of Standards and the others were coated by seven manufacturers to whom the uncoated collector rings had been submitted by the Tank Automotive Center for application of coatings recommended by these manufacturers. After approximately 2500 miles of operation on M-4 tanks, only the new type ceramic coating received an "excellent" rating.[2] The others all showed damages, most of which consisted of thermal cracks and blisters.

[2]*The performance of these coatings in both laboratory and service tests led to the preparation of appropriate specifications. These were issued as Army-Navy Aeronautical Specification AN-C-133, and as tentative specification AXS 1449 of the Army Ordnance Department.*

## V • PRODUCTION OF COATED EXHAUST PARTS

Commercial production of low carbon steel exhaust stacks with ceramic coating A-19 was started in 1944. By the end of the war three enameling companies had applied the coating to substantial quantities of aircraft exhaust stacks. Since the shortage of stainless steel never became acute enough to limit its use in aircraft, the A-19 coating on low carbon steel was used through preference rather than through an enforced substitution.

Another application of the A-19 coating which reached the production stage before the end of the war was the coating of tail pipes for the exhaust systems of the amphibious truck or "DUC." One section of this pipe was 9 feet long by 1¾ inches inside diameter, with "S" shaped curves at each end. Two other sections were approximately 3 and 2 feet long, respectively, with 2½ inch inside diameter. It is considered significant that the coating could be applied satisfactorily to such complex shapes. These pipes were originally fabricated of uncoated low carbon steel and failed rapidly in service, through corrosion. Not only high operating temperatures but also proximity to and contact with ocean water contributed to the corrosion. Tests showed that coating A-19 provided good protection.

## VI • POTENTIAL USE OF COATINGS

In addition to the use of the new coatings for the protection of low carbon steel in various military exhaust systems, there are a number of other possible applications where the new coatings, or modifications thereof, might be beneficial in prolonging the life of steel parts which are subjected to relatively severe temperature conditions. A list of such potential applications would include the following: (1) domestic stove parts such as grates or burners; (2) industrial furnace parts, such as muffles, dampers or burners; (3) parts for heat interchangers; (4) heat baffles for continuous enameling furnaces; (5) annealing boxes, and (6) mufflers and tail pipes for busses, trucks and automobiles.

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**Table 1.**

**Mill batches used in the preparation of ceramic coatings A-19, A-20, and A-55m**

| *Ingredient* | *Parts by Weight* A-19 | A-20 | A-55m |
|---|---|---|---|
| Frit 1[1] | 50.0 | — | — |
| Frit 11 | 50.0 | 100.0 | 100.0 |
| Calcined alumina[2] | 25.0 | 20.0 | 15.0 |
| Enameler's clay | 10.0 | 6.0 | 15.0 |
| Black cobalt oxide | 1.00[3] | 0.25[3] | 0.50[3] |
| Citric acid crystals | 0.05 | 0.05 | 0.03 |
| Water | 50.0 | 50.0 | 50.0 |

[1]The ratio of the soft frit (No. 1) to the hard frit (No. 11) may be varied in either direction when the resulting slip is better suited to local plant conditions.

[2]Aluminum Ore Company's No. A-1.

[3]This amount of cobalt oxide may be reduced or even eliminated without damage to performance characteristics. The nearly black color imparted by the cobalt is conducive to uniformity of appearance.

# The sheet metal outlook for 1947

## explaining the current picture and estimating the future supply

*By R. C. Todd* • VICE PRESIDENT, THE AMERICAN ROLLING MILL CO., MIDDLETOWN, OHIO

THE *Iron Age* in its issue of October 17, 1946, had an article titled "Where is the Steel?" which indicated that the subject was a mysterious one to them.

On September 28, 1946, the magazine *Business Week* printed nine full pages of an able analysis under the subject "Hard-to-Get-Steel" and "When Will There be Enough of Industry's Basic Metal?" There was a great demand for reprints of this study.

Recent issues of *World Report* have contained many articles stressing shortages of steel all over the world. To make matters worse, a large portion of the world's steel producing capacity has been destroyed.

By contract, the United States was able to increase its capacity to produce steel during the war, but, as we shall see later, most of these increases were not for products that help to fill peacetime needs.

It is true that World War II consumed tremendous quantities of sheets and strip. Landing mats alone required 100,000 tons a month. Bombs, shell cases, containers, powder cans, tanks, trucks, jeeps, airplanes, radios, walkie-talkies, Nissen huts, pipe lines, and a myriad of such articles took every type of commodity sheet steel and specialty sheet steel that was made. But even with this heavy demand, our sheet and strip capacity proved adequate, because all (except vitally needed) peacetime durable goods production was halted. For that reason, no wartime increases in sheet capacity were installed.

On the other hand, our need for plates, tubing, and a few other steel products multiplied rapidly beyond our 1940 capacity to produce them.

For these requirements there occurred during the war period a feverish expansion of blast furnaces, openhearths, and plate mills, etc., resulting in an increase of ingot capacity between 1940 to 1945 from 82,000,000 to 92,000,000 tons. During 1940, the actual ingot production was about 67,000,000 tons or 25,000,000 tons less than the 1945 ingot producing capacity.

With such a background of expansion in basic steel making capacity, many are inquiring why practically all sheet steel fabricators have secured tonnage during 1946 at a rate less than they secured in 1940 and '41.

### Reasons for reduced sheet steel shipments to fabricators

The first and most obvious reason, of course, is strikes. Wasteful stoppages in the steel and coal industries have cost us almost 22 million tons of steel since V-J Day. This tremendous loss came at a time when we could ill afford it. Not only did it increase pressure on demand, but also on prices, costs, and on many other factors that held up our reconversion to a peacetime economy.

Shortage of scrap is another factor which has held back full production. Most mills have been operating on a hand-to-mouth basis and occasionally furnaces have had to shut down completely for lack of basic raw material. A shipping strike on the Great

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**Production comparisons for sheet steel products**

| | Average Yearly Production 1940 & 1941 | Yearly Rate Based on 3rd Qtr. 1946 Production | Present Rate Compared with Prewar Increase | Present Rate Compared with Prewar Decrease |
|---|---|---|---|---|
| Warm Air Furnaces | 489,000 | 756,800 | 267,800 | |
| Bath Tubs | 1,077,000 | 1,172,000 | 95,000 | |
| Sinks | 1,666,000 | 2,160,000 | 494,000 | |
| Electric Ranges | 589,000 | 736,000 | 147,000 | |
| Water Heaters | 1,671,000 | 3,040,000 | 1,369,000 | |
| Washing Machines | 1,784,000 | 2,456,000 | 672,000 | |
| Trucks & Busses | 936,000 | 1,162,000 | 226,000 | |
| R.R. Passenger Cars | 238 | 652 | 414 | |
| Locomotives | 802 | 2,312 | 1,510 | |
| Farm Machinery | $653,500,000 | $758,400,000 | $104,900,000 | |
| Automobiles | 3,718,000 | 2,800,000 | | 918,000 |
| Refrigerators | 3,335,000 | 2,684,000 | | 651,000 |
| Freight Cars | 68,130 | 56,720 | | 11,410 |
| Gas Ranges | 2,010,000 | 1,796,000 | | 214,000 |
| Lavatories | 1,820,000 | 1,788,000 | | 32,000 |

Note: Figures are from available records on mass produced products and are not presented as a complete production survey of sheet iron and steel products.

**Present and estimated future sheet production compared with 1941**

| | Tons Shipped in 1941 | Annual Rate For Shipments Based on Shipments in 3rd Qtr. 1946 | Probable Capacity Available in 2nd Half 1947 |
|---|---|---|---|
| Hot Rolled Sheets | 7,264,943 | 6,613,000 | 7,400,000 |
| Cold Rolled Sheets | 3,024,960 | 4,380,000 | 6,300,000 |
| Galvanized Sheets | 1,621,635 | 1,616,000 | 1,622,000 |
| All Other | 742,001 | * | * |
| | 12,653,539 | 12,609,000 | 15,322,000 |

*After 1941 "All Other" classification was thrown into Hot Rolled or Cold Rolled.

*Right: Russell Jarret, Noma's Estate Division, admires their new home freezer as it is inspected by L. L. Northrup, McCall's Corp., and Geo. McFadden, Ohio Foundry & Mfg. Co. The one piece top is porcelain enameled.*

*Below: Caloric Stove Corporation's J. W. Roberts stands by a "cut-away" model of the company's range — all porcelain inside and out — with M. O. Weygandt, Marshall Furniture, Sweetwater, Texas, and J. D. Jeffries, of Caloric.*

## a trend to feature porcelain

HUGE crowds filled the hallways and display rooms of the American Furniture Mart and the Merchandise Mart in Chicago for the winter market, which opened January 6. At the Furniture Mart Press Club luncheon, Lawrence Whiting, Mart president, stated that requests for passes from buyers prior to the market opening were 43,581 as compared with 40,340 a year ago. These requests represented 11,679 stores as compared with 10,146 last year, he said.

The Merchandise Mart reported 41,000 requests for admittance compared with 33,000 in January of 1946.

### Elaborate show rooms

Exhibitors on the 5th floor of the Furniture Mart, occupied principally by major appliance manufacturers, have gone "all out" in the building of spacious, modern and attention-getting display rooms. Many others were represented in the "Appliance Mart" on the 17th floor, including many smaller and temporary displays.

At the Merchandise Mart, major appliance manufacturers and many of the leading producers of porcelain enameled holloware were located on the 14th floor, with some porcelain enameled products on the 5th.

### With the exhibitors

While changes in porcelain enameled products

*Above: Charles Marvin, pointing, describes the porcelain enameled heat exchanger for Norge oil-fired room heaters to R. J. Calden, Peirce Phelps, Phila., Pa.; and to four representatives of Leo J. Meyberg, San Francisco: W. J. Lancaster, F. C. Lindquist, J. T. Templeton, Jr., and J. M. Scales.*

*Right: H. F. Arnold extols the advantages of the porcelain enameled interior of Westinghouse Laundromats. Among observers are Lindell, Brewer and McCarty of Western United Gas and Electric; W. A. Seymour, of Hespeler, Ontario; and L. Bazell, of Detroit.*

# AHE

# GIARKETS

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*Left: "Sure! Use it as a table top—it's porcelain enameled," says Monroe A. Touissaint, of American Ironing Machine Co., manufacturers of "Simplex" cabinet ironers, to Lee Olson, Barlow & Seelig, who offer the "Speed Queen."*

*Below: This corner of the display room of Altorfer Bros. shows a small part of the usual crowd observing a demonstration of the A-B-C-O-Matic. This unique washer has several porcelain enameled components.*

## rcelamel on household products

and appliances for the most part have been conservative, there were some new applications of porcelain enamel for components and a general "dressing up" of most lines.

### Porcelain enamel well represented

We skipped the attractive models being photographed in the Norge display rooms (believe it or not) to focus attention on a cut-away exhibit of the heat exchanger used for the Norge oil-fired room heater. The complete heat exchanger unit is protected with ground coat porcelain enamel.

Then there were the Bendix automatics with their porcelain enameled tubs and other components; Conlon and Moore washers and "stoves"; and then more automatic washers.

Westinghouse displayed a cut-away Laundromat showing porcelain enameled tubs and parts. We learned that G.E. is strongly playing up the porcelain enameled inner tub on their automatic.

The familiar slogan of American Stove — "More Women Cook on Magic Chef than any Other Range" — was prominently displayed.

The Altorfer Bros. display room was apparently jammed at all times with buyers viewing a demonstration of the A-B-C-O-Matic, which is different in principal than most of the automatics with its Flexor cylinder and Flexor base of porcelain enamel as well as the tub.

There were plenty of conventional washers also.

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*Above: J. J. Mascuch and Al Birkenmeier, of Anderson Stove Co., listen to a glowing description of the merits of Armstrong Products Corporation's space heater and ironer (porcelain enameled, by the way) by Joe Briggs, manufacturers' representative of Dallas, Texas.*

*Left: S. M. Barnes, of Roper, points to the "super deluxe" eight-burner, dual broiler, steam cooker, etc., Roper Range, as R. C. Rose, of F. K. Robeson Co., Champaign, Ill., observes the porcelain enameled top with integral burner bowls in white.*

QUICK TRIPS TO ENAMELING PLANTS

## A visit to Columbus Porcelain Metals Corporation

*By* DANA CHASE

A VISIT to Columbus, Ohio, brought us to Columbus Porcelain Metals Corporation, a new box furnace jobbing plant. In this plant the owners are, in every sense, the plant operators as well. Principals in the company are Gordon Lasiter, president; Hugh Scott, vice president; John Scott, secretary; Ellis (Bud) Lasiter, treasurer; George Zelenski, superintendent; and Robert Lewis, plant engineer.

The Scott Brothers and Lewis were all formerly with Cooperative Enameling Company in Cleveland; Bud Lasiter was formerly shift foreman in the Ferro Enamel frit department; Zelenski was in the paint finishing department at Lincoln Electric Co., Cleveland; and Gordon Lasiter was shop superintendent of Erie Enameling Company, but before that was for eight years with Cleveland Co-op.

After deciding to start out on their own in the enameling business these men formed a corporation and on March 9, 1946 leased a building (not then built) near Port Columbus, the capital city's airport. Just as soon as the roof was on the building, the necessary furnace was started. The plant was completely equipped and ready to go by September.

### Six-burner furnace

The box type furnace has a special flue arrangement and is equipped with six burners using natural gas. They are mounted three in the front and three in the back. The furnace is designed for a quick come-back with a heavy load. Operating figures show an approximate cost of 75¢ per hour. This is the average for a month.

The pickle room has five tanks, plus a tank dryer. This includes cleaner, hot rinse, acid (cold muriatic), cold rinse and neutralizer. The cleaner, cleaner rinse and neutralizer tanks are of steel; acid and acid rinse are of wood. The steel tanks are heated with submerged tubes.

The mill room is equipped with four mills — one 600-lb., two 200-lb. and one 150-lb. Mill control facilities adjoin the mill room. Ground coat dip tank is 36″ wide, 12″ deep and 8′ long, with a sloping bottom to the center to provide for the later installation of a circulating system. The tank is portable. At present it is located parallel and adjoining a continuous lay-down type conveyor. This is a drier conveyor, with pin type ware supports, which leads to a reenforcing booth at the opposite end.

The schedule is to run ground coat in the afternoon, fire it and bank it on wood racks. Cover coat spraying is started on the morning shift and the ware is finished for shipment in the afternoon. Spraying is accomplished in two stationary 8½′ booths, and two reverse booths on the drier conveyor. These reverse booths not only serve as reenforcing booths, but are washed down and used as continuous conveyor spray booths for white. The entire plant is housed in a space of only 7800 square feet. When we visited the plant, stove work, architectural porcelain parts and hot water tank heads for plastic

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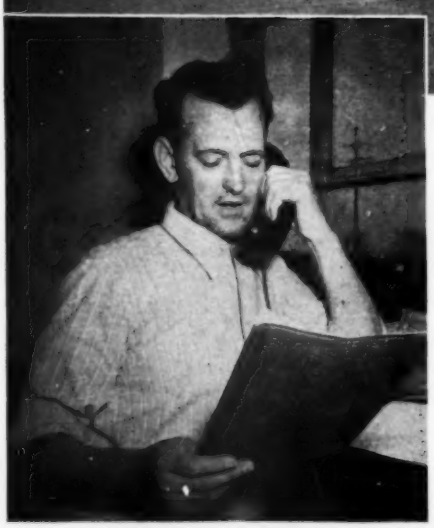
*Firing a load of sheet steel parts on a "T" rack in the six-burner, box-type furnace. Most of the ware is fired in hanging position.*

finishfotos



*Gordon Lasiter, company president, talks over an enameling job with a customer. When the job is in, he will also help produce it.*

Any woman's heart will yearn for one of the new, beautifully styled and enamelled "Universal" electric ranges made by Landers, Frary & Clark. Beneath the smooth, rich, glowing surface of that enamel is iron and steel which had to be clean as a whistle before coating and firing.

### MANY REJECTS VS. "PERFECTION"

Under old methods of cleaning and pickling much of the work was rejected. Under a new method, developed with the help of a Pennsalt representative and Pennsalt products, the work was judged "perfect."

### NO TANKS OR SOAKING . . . ALL SPRAY

In an enclosed unit, parts now move on an overhead conveyor; are never dipped. All cleaning, pickling and rinsing is done by sprays. Fumes are eliminated by a water wash. Pennsalt cleaners are used exclusively.

### WHAT IS YOUR METAL CLEANING PROBLEM?

Pennsalt men have helped many manufacturers to turn out *better work—faster—at lower cost*—they may be able to help you. Write or wire to our Philadelphia headquarters and add our experience to your own.

**PENN SALT**

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**PENNSYLVANIA SALT MANUFACTURING COMPANY**

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→ *from Page 16*

the beam being thrown the length of the furnace beneath the ware. If a piece of ware should fall from the conveyor while traveling through the furnace, the beam is broken, the furnace conveyor stops and an alarm is sounded.

Final inspection of the finished ware — immediately following the burning of the last cover coat — is done in a brilliantly lighted area and the inspectors use high wattage hand reflectors in examining the ware at close range.

After final inspection the ware continues on conveyors to the crating line where each unit is securely packed. The crated units continue again on conveyors to the storage floors or by remaining on the conveyor, which is circuited through the shipping dock, can be loaded directly into cars for shipment to the customer.

### Conveyor system holds 1600 bathtubs

Facilities in operation at the present time permit the production of 75 bathtubs per hour, or 300 pieces of smaller ware such as lavatories and small kitchen sinks.

It is of interest to mention that a total of 12,638 feet of conveyor lines are used in the porcelain enameling plant, which includes the metal finish and welding departments. When running bathtubs, a total of 1600 units are suspended upon these conveyors when the system is full.

Since the initial operation of a pilot plant in 1933, when production started, approximately one million bathtubs, lavatories and kitchen sinks have been produced and are installed in hundreds of thousands of homes, apartments, hotels and other building operations over the country. Since reconversion in November of 1945, well over 250,000 pieces have been produced.

## Here's an answer in

This modern and colorful bathroom is typical of many designed by the Briggs design research department. Here we see acid resisting, porcelain enameled Briggs Beautyware illustrated in a setting which might well prove the answer to a dream of better living in the minds of thousands of future home owners — those who are looking to the day when they will own their own modern, efficient and comfortable homes — their dream homes.

• It would be easy for any finish reader to visualize that in addition to using porcelain enameled plumbing fixtures, the next logical step in the use of porcelain enamel in a bathroom such as this is to complete the walls in porcelain enamel, as pictured, and give the entire bathroom the spic and span, easy-to-clean atmosphere so desirable in this part of the home.

• Notice that the effective use of glass, bright metal and other modern materials *with porcelain enamel* is complimentary to each product.

**in porcelain enamel**

**to a dream of better living . . . .**

DESIGNED AND ILLUSTRATED BY BRIGGS DESIGN RESEARCH DEPARTM

# 2 WAYS
## TO APPROACH A COLOR PROBLEM

## GROPE AROUND IN THE DARK OR ASK DRAKENFELD TO HELP

WHEN you grope in the dark for ways to wipe out "color bugs," you use valuable time needed for other equally important work.

For many years Drakenfeld has been giving "first-aid" to many porcelain enamel manufacturers on color problems. Why not let us help you? If you want a new color created or an old one matched — whatever your specific requirements — we believe that our technologists can assist you to improve production speed, minimize rejects, and produce better porcelain enameled products more profitably. You can rely on Drakenfeld color service, whether you produce signs or table tops, home, institutional or professional utensils and appliances, or manufacture architectural or industrial porcelain enameled products.

We would like to demonstrate how our porcelain enamel color research facilities and technical counsel can help you shed light on color problems. We hope you will avail yourself of Drakenfeld's broad experience and helpful service. Let us discuss your requirements across your desk. Write us today.

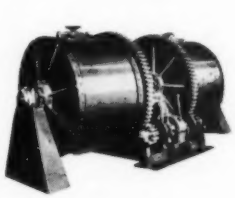
**DEPENDABLE SERVICE ON:** Oxide Colors . . . Screening Paste . . . Graining Colors . . . Squeegee Oils and Mediums . . . Rotospray Sifters . . . Steveco Mills Porcelain Grinding Balls . . . Porcelain Mill Linings.

### If It Flows ROTOSPRAY Can Strain It!

Saves time and labor. Strains through a vertical screen — no clogging. Long-life screen often saves enough to pay for the equipment. Standard and Junior sizes. May be suspended or placed on floor. Capacity ranges from 300 to 1000 gallons per hour, depending on the nature and specific gravity of the product, screen mesh and size of sifter. Descriptive folder sent on request.

### 5 SAVINGS WITH STEVECO MILLS

**Time**
**Labor**
**Horsepower**
**Floor Space**
**Initial Costs**



Steveco high-efficiency duplex mills wet-grind porcelain enamel materials better, faster, and at low cost. Many outstanding construction features proved in hard day-after-day service in many plants. Wide range of sizes and linings, with all types of drives. Write for catalog, then let us study your grinding needs and recommend the correct type for your requirements.

Drakenfeld

**YOUR PARTNER IN SOLVING COLOR PROBLEMS**

**B. F. DRAKENFELD & Co., Inc. 45-47 Park Place, New York 7, N.Y.**

*Factory and Laboratories:* Washington, Pa.

*Pacific Coast Agents:* Braun Corp., Los Angeles 21 . . . Braun-Knecht-Heimann Co., San Francisco 19

# The Washington round-up

## *By Wilfrid Redmond*

THE President recommends in his budget message that priority and allocation controls on a few commodities in short supply be extended beyond March 31, when they expire under the Second War Powers Act. He also asks the continuation of a few other minimum controls which are considered indispensable for the time being.

### Tin, antimony, lead and zinc

Control over tin and possibly antimony will probably be recommended. The budget contemplates an expenditure for the fiscal year 1948 of $550,000 for antimony. RFC will continue a public purchase program for antimony in some areas, although import controls have been removed except for public purchase contracts already negotiated or in process of negotiation.

"During the rest of this fiscal year (1947)," the President said in his message, "the Office of Temporary Controls will discontinue as rapidly as possible direct controls over business operations previously administered by the Civilian Production Administration and the Office of Price Administration. Although a few essential controls should be retained a little longer, these too will be terminated as soon as conditions permit."

The President assumed in his budget program that the Premium Price Plan for copper, lead, and zinc will not be extended through 1948. The program, which carries an appropriation of $100,000,000 for premium payments to high cost producers of these metals, expires June 30, 1947. It was established during the war to encourage utilization of our marginal mineral resources when shortages of critical materials were acute.

### The "priority" situation

In a recent action, CPA relaxed PR-28, the "bottle neck" regulation which was designed to remove stoppages in the reconversion program resulting from lack of materials.

Under the amendment, CPA will no longer grant CC priority ratings for production materials; maintenance, repair and operating supplies; capital equipment or construction materials or equipment for the purpose of starting or maintaining any individual plant or business or to alleviate individual hardship. Direction 20 of the regulation was revoked, thereby terminating special rating assistance to small businessmen and veterans.

CC ratings already issued will continue valid. Priority assistance will also be continued for essential community needs and to increase the production of veterans' housing materials determined to be in critically short supply. However, no ratings will be issued for the purchase of specialized machinery for the manufacture of housing materials.

Rating assistance for items to be incorporated in non-housing construction will no longer be given, this being consistent, according to CPA, with the decision to discontinue issuance of HH ratings for items to be used in housing.

### Washington's steel supply picture

The steel industry, Washington estimates, will produce 60,900,000 tons of steel in 1947. This output, CPA maintains, will be 6,000,000 product tons short of total requirements if distribution controls are removed. The industry produced 47,000,000 product tons in 1946.

The Steel Products Industry Advisory Committee, in a closed session with Civilian Production Commissioner John C. Houston and National Housing Expediter Frank Creedon, asked for removal of all distribution controls on steel products, including housing materials, after March 31. If this action is taken, the committee said, the industry will take care of all requirements in 1947. The industry's contention is that special assistance programs interfere with mill schedules and cut down production.

### Relaxing construction restraints

The CPA is raising to $50,000,000 its weekly rate of approvals for non-residential construction, Major General Philip B. Fleming, Temporary Controls Administrator, recently announced. A $35 million average weekly ceiling for approvals has been in effect since the end of August. This is the first evidence of relaxation of the Wyatt housing program to permit industrial construction which was anticipated when Frank Creedon took over Wyatt's job. CPA is notifying its field officials to approve future applications for foundations and structural frames in areas where there is excessive unemployment in the heavy construction trades, where cement is in free supply, and providing critical materials will not be used.

The new housing program which lifts the Wyatt building bans to permit non-veteran housing construction, includes a limitation of one bathroom per dwelling. However, additional bathrooms may be included in the construction of either the veteran or non-veteran dwelling, but equipment may not be installed for these extra facilities. The additional bathroom may, of course, be equipped later, if the owner can do it using his $400 small job allowance or otherwise get authorization.

### Lustron housing plans changed

The case of the Lustron Corporation has been closed as far as it concerns acquisition of the controversial Dodge-Chrysler plant at Chicago. The Corporation recently advised the Office of the Housing Expediter that it would scale down its production program for factory-built steel enamel houses, and will not require the Chicago plant. Accordingly, Housing Expediter Creedon announced that the necessary legal steps are being taken to cancel the directives previously issued to the War Assets Administration allocating the plant to Lustron.

Recently, the Office of the Housing Expediter explained, Lustron submitted a proposal which would involve production of 15,000 homes this year instead of 30,000 units

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*Right: Roy A. Bradt, vice president of the Maytag Company, Newton, Iowa, was elected by the AWIMA general assembly at its annual meeting of regular and associate members. Bradt has been a member of the executive committee of the Washer-Ironer organization for six years.*

*Below: New members of AWIMA are Kenneth Keith, left, general manager, and Gerald Hecker, Jr., sales manager, of Little Giant, Inc., Hayward, California.*

# WASHER

# MEM

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## new officers to he

ELECTION of Roy A. Bradt as president, endorsement of the multi-committee method of promoting the mutual good interests of the industry on behalf of the trade and the consumer, and reaffirmation of the code of ethics which governed its operations for civilian needs before the war were highlights of the American Washer and Ironer Manufacturers' Association annual meeting, January 8, in Chicago.

Mr. Bradt, vice-president of the Maytag Company, Newton, Iowa, was advanced to the presidency from membership on the Association executive committee. In 1943-44 he was chairman of the Association's important Post-War Planning Committee, whose recommendations sounded the general keynote for the industry's intra-membership and Washington activities through the remainder of the war and post-war transition period. He was active also as a member of the home laundering equipment OPA industry advisory committee.

### Reports of sub-committee chairmen

INDUSTRIAL RELATIONS, *E. C. Buchanan, Apex Electrical Manufacturing Co.:* The industry has a great opportunity for working to advance the mutual good interests of employer and worker through the industrial relations experts of the Association.

IRONERS AND DRYERS, *I. N. Merritt, Conlon Corporation, Chicago:* The markets for these remain

*Above: This snapshot of leaders in the associate members group includes, front row: Fred Dechant, Armco; Harry Almond, Alcoa; Carl Huff, Bliss & Laughlin (chairman of the Associates Committee); J. E. Britt, Mullins Mfg. Corp.; Harry Kunkelman and J. D. Delanty, Bliss & Laughlin. Back row: John Ingwersen, Armco; Nick Etten, Chamberlain Corp.; A. F. Boone and Terry Craig, Mullins.*

*Right: H. C. Bullard, Chicago Mill & Lumber, holds a friendly confab with S. J. Callahan, Altorfer Bros. Perchance they're crating washers.*

## IRONER

## MEET

*Left: T. W. Roberts, top executive of Vactric Ltd., London, England, and C. G. Frantz, president of Apex Electrical Mfg., shake on the fact that Apex makes good washers. Vactric will build the Apex line for England. Frantz is an association vice president.*

*Below: Edward A. Ash, F. L. Jacobs Co., Detroit, builders of the Launderall automatic washer, chats with Bob Anderson, manager of Ingersoll Steel's contract sales division.*

## WIMA for 1947

virtually untapped and manufacturers and dealers alike should campaign for triple sales.

INTERNATIONAL MARKETS AND TRENDS, *W. Homer Reeve, Easy Washing Machine Corporation, Syracuse, N. Y.:* With the resumption of worldwide commerce, numerous foreign markets should be studied by Association members. Trade information is readily available.

ENGINEERING AND RESEARCH, *P. Eduard Geldhof, Nineteen Hundred Corporation, St. Joseph, Mich.:* Industry engineers spent five years perfecting the manufacturing standards observed today by the Association members. Engineers and the industry in general must plan to cope with new problems as variations in appliance design increase.

ASSOCIATES, *Carl L. Huff, Bliss & Laughlin, Harvey, Ill.:* The industry's associate members, the suppliers, have gained greatly in their relationship to the manufacturers who, in turn, have benefitted by obtaining a better understanding of the associates' problems. The special session staged by the associates at the 1946 summer meeting was considered epochal in its common benefits.

### New manual for school instruction

ADVERTISING AND MARKET RESEARCH, *W. Neal Gallagher, Automatic Washer Company, Newton, Iowa:* Publishing of the Association's manual for school instruction in the use of the washer, dryer and ironer has been an unqualified success. It

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*Above: John Inglis Co., Ltd., Toronto, Ontario, Canada, was well represented by J. E. Friend, branch manager; E. M. Bassingthwaighte, manager; W. R. McLachlan, general manager; J. P. Regan, sales supervisor; and H. A. Scoones, representative. The Inglis Company will build the A. O. Smith "glass-lined" water heater in Canada in a new, modern porcelain enameling plant.*

*Left: Joseph Groshans, of American Ironing Machine Co., lunches with H. M. Conlin, midwest sales manager for Landers, Frary and Clark.*

* AN ING-RICH
CERAMIC ENGINEER

They start with diplomas from good technical institutions . . . so they're thoroughly grounded in ceramic engineering.

But they don't stop there—not by a long shot. Before any man can represent ING-RICH as a ceramic engineer he must have long and exhaustive *practical experience* with frit. He must know how PORCELFRIT behaves during every process and under all conditions. He must qualify himself to discuss YOUR frit problems intelligently and helpfully.

There's no substitute for practical experience. These school-and-plant-trained ING-RICH ceramic engineers are available to you upon request, without obligation on your part.

ING-RICH
PORCELFRIT
"The Plant Tested Frit"

INGRAM-RICHARDSON MFG. CO., OF INDIANA, INC.
OFFICES, LABORATORY AND PLANT, FRANKFORT, INDIANA

# NEWS

### Chicago District Enamelers Club February meeting

The next meeting of the Chicago District Enamelers Club is scheduled for Saturday, February 15, at the Graemere Hotel, 113 North Homan, Chicago. The time is 12 o'clock noon.

The speakers and their subjects are, W. E. Jones, president Management Controls, Des Plaines, Illinois—"How the New War-born Statistical Methods of Quality Control Can be Applied to Porcelain Enameling", and Ken Wells, manager, organization development for the Chicago area of the National Association of Foremen —"Labor Relation Problems that Management is Facing."

### Burnside to Florence Stove, Gardner

Douglas D. Burnside, formerly superintendent of the Stove Division, Consolidated Vultee Aircraft, Nashville, Tennessee, has been appointed plant superintendent of Florence Stove Company's Gardner factory, according to an announcement made by Vice-President Harold O. Berry, general manager of the Gardner plant. William E. Burns will be assistant to Mr. Burnside.

The new Florence superintendent has had an extensive background in all manufacturing phases of the stove industry. For fifteen years he was associated with the American Stove Company where for six years, prior to 1944, he was general superintendent of the St. Louis plant. While at American Stove he was actively engaged in product design and development as well as in engineering and research on liquid fuel stoves and gas ranges. During the war he was industry representative on the War Production Board.

### Goddard promoted by Sylvania

Charles H. Goddard, assistant sales manager of the Lighting Division, Sylvania Electric Products, Inc., was appointed general manager of the Fluorescent Fixture Division effective January 1, 1947, according to an announcement by Don G. Mitchell, president of Sylvania. In his new position he will headquarter at the Ipswich, Massachusetts plant.

Goddard first became associated with Sylvania in 1944 and in September, 1946 was made assistant general sales manager of Lighting Products. Before joining Sylvania, he was vice president of the Pittsburgh Reflector Company, with which he was associated for fourteen years.

Active in lighting circles, Goddard is treasurer of the Illuminating Engineering Society and represents Sylvania in the Lighting Fixture Section of the National Electrical Manufacturers Association. He is a graduate of Ohio University, Class of '27.

### Dr. C. M. Slack division research director

Dr. Charles M. Slack, who developed an electronic tube making possible millionth-of-a-second X-ray exposures, has been appointed director of research for the Westinghouse Lamp Division, Ralph C. Stuart, vice president, announced recently.

### Prefabs coming says McCalls

Prefabricated houses, of which much has been heard during the housing shortage, will be more in evidence in all parts of the country this year, McCall's reported to its readers through its National Newsletter feature in the January magazine. The reason prefab construction got behind last year is that a house factory must have all the parts before it starts production, while other builders can start with what they have and count on getting other components later.

### U. S. to exchange German technical information with Great Britain

In a joint statement, W. A. Harriman, secretary of commerce, and Sir Stafford Cripps, president of Great Britain's Board of Trade, recently announced an Anglo-American agreement for the exchange of German technical information acquired by the two nations since VE-Day.

Hundreds of thousands of important German scientific and technical documents are said to have been uncovered by British and American investigators in their respective zones, and microfilm copies have been made. Under the present agreement, representatives of each nation will be able to select from the other's storehouse of reports the items which they find valuable.

In America, requests for British documents and summaries should be addressed to the Office of Technical

Services, where the British material received is abstracted and publicized through the Bibliography of Scientific and Industrial Reports.

## Norge holds "school" for district sales representatives

Newly-appointed district sales representatives for the Norge division of Borg-Warner Corp. are shown here listening to R. H. Pizor, manager of laundry equipment sales, as he explains features of the firm's new washing machines. The trainees attended a six-week sales training course in Detroit and at Norge plants, preparatory to dealer contact which started with the Mid-Winter Furniture Show in Chicago.

The trainees were started through an intensively comprehensive six-week sales training course by product, sales promotion, advertising and service managers. Following a four-week attendance at the school in Detroit, they were taken on a tour of the company's plants in Muskegon and Muskegon Heights, Mich., and Effingham and Herrin, Ill., to see the products in actual manufacture.

The final phase of this program took place during the Mid-Winter Furniture Market when the new representatives worked with others in the sales department describing product features to visitors at the Norge display in the Furniture Mart.

### Pressed Metal Institute expands activity

Concluding its fourth year of activities, the Pressed Metal Institute, said to represent a half billion dollar industry, has more than tripled its membership and has expanded its activities in both old and new markets. The Institute is now functioning through thirteen geographic districts, each having its own chairman and committees which are integrated with the national program.

Forty-six nation-wide district meetings were held during 1946 with an overall attendance of more than 12,000. These meetings were held for the purpose of solving problems of mutual interest and have been addressed by outstanding men including: Hon. Keen Johnson, under-secretary of labor; Geo. B. Nesbit and A. P. Lucas, metallurgists, Bethlehem Steel Co.; Geo. E. Sokolsky, columnist and author; Asa M. Knowles, dean, business administration, Rhode Island State College; Bennett Chapple, assistant to the president, Armco; and Judge Lawrence B. Morris, consultant on labor matters. Papers presented covered a wide range of subjects both from the standpoint of human relations and technical developments in the industry.

With the growing importance of stampings in the design and production of consumer goods, output of stampings in 1947 will exceed any previous peacetime or even war years, providing labor problems and labor shortages improve, it is stated by Clarence W. Custer, president of the Pressed Metal Institute and president of American Stamping Company, Cleveland, Ohio.

In Mr. Custer's opinion, new mechanical and hydraulic presses, new developments in welding and brazing, improved handling of stampings, new methods and techniques developed during the war years place the industry in an excellent position to make a vital contribution to production in the year ahead.

The Institute has completed a comprehensive report based on analysis of some eighty labor contracts of stamping manufacturers and is completing a job description glossary which it believes will be invaluable to stampers.

### Edison G. E. (Hotpoint) changes name $17,000,000 expansion program

Hotpoint, Inc., became the official name of Edison General Electric Appliance Company on January 2, 1947, according to an action of the Board of Directors announced by R. W. Turnbull, president. The new company name will carry the sub-title "a General Electric affiliate" to identify it as a part of the General Electric Company.

Asserting that the increased public acceptance of the brand name Hotpoint had obscured the company's former corporate name, Mr. Turnbull said, "We felt that now was the time to change and simplify the company name to match this acceptance." He added that Hotpoint, 40 years ago, was the first appliance manufacturer to advertise nationally and that millions of dollars have been invested in the establishment of this trade name.

The company is embarking upon a major enlargement program involving $17,000,000 in capital and plant expansion in the Chicago area, which will result in the employment of several thousand additional skilled workers. The Chicago physical expansion will increase manufacturing capacities to triple present facilities for the manufacture of electric ranges, water heaters, and dishwashers, Mr. Turnbull said.

The company's facilities for the manufacture of electric refrigerators

and home laundry equipment have already been expanded.

### Carl Lyon retires

After more than forty-six years of active service with Cribben and Sexton Company, manufacturers of the Universal gas range, Carl E. Lyon retired as vice president and director of purchases, effective December 31, 1946. However, Lyon will continue his association with the company in an advisory capacity.

It was in August, 1900, when Carl Lyon joined Cribben and Sexton as a stockroom boy. In time he was promoted to timekeeper in the nickel shop, then to head timekeeper and paymaster. Later he was made general superintendent, then vice president and director of purchases.

Most stove men and many enamelers know Carl. His many years of association in the stove industry span the gradual transition from coal cook stoves to automatic gas ranges. He has also assisted in the direction of conversion and re-conversion through two war periods.

### New Philco general P.A.

William MacMurtrie, who is widely known throughout the radio industry, with which he has been identified since 1921, has been appointed general purchasing agent of Philco Corporation, it was announced by William Balderston, executive vice president.

Raymond A. Boyce, former general purchasing agent and a member of the board of directors, has been promoted to director of purchases and will concentrate on over-all planning and general administrative work on the staff level.

### Washer-ironer sales for November and eleven months of 1946

Factory sales of household washers totalled 216,634 in November, compared to 247,350 in the preceding month and 103,288 in November, 1941, final full year of pre-war production in the industry, according to announcement by the American Washer and Ironer Manufacturers' Association. Household ironer sales were 11,973, compared to 11,754 in October and 8,780 in November, 1941.

Washer sales for the eleven months of 1946 were 1,827,991, compared to 1,846,833 in the same period of 1941. Ironers totalled 109,147, compared to 122,904.

### Burdett doubles production capacity in new plant

Burdett Manufacturing Company has announced a move to new and larger quarters at 3433 West Madison Street, Chicago.

According to company officials, recently doubled production capacity represents the first phase of a broad development program to include extensive research on new and improved applications of infra-red gas heat, as well as fundamental research on the basic infra-red principle. Additions to the engineering staff have already been made, according to the company spokesmen.

## Pemco honor society presents service awards

*W. R. Greer receives a gold wrist watch from R. H. Turk. Seated are Karl Turk, Sr., company pres., and G. H. Spencer-Strong, dir. of research.*

The Pemco Honor Service Society held its annual banquet recently in the main ballroom of the Southern Hotel, Baltimore. This society consists of employees of Pemco who have completed a minimum of ten continuous years with the company.

At the annual meeting, eligible members receive a suitable engraved "key" designating length of service (in periods of five years). Total service years recorded at the banquet were 655.

Richard Turk, executive vice president, presented service award keys to: E. G. Porst, Edward Heimlein, Albert Jones, John Reuling, Samuel Betz and Harry Steinfelt (ten years); Karl Turk, Jr., (fifteen years); and H. G. Wolfram (twenty years).

W. R. Greer, vice president, and C. E. Simonson, assistant plant superintendent, each received an engraved gold watch in recognition of twenty-five years of continuous service.

## Washer comparison tests completed by association engineering standards committee

*L. to R.: John B. Dyer, Easy Washing Machine Co., Syracuse, N.Y.; R. M. Mitchell, 1900 Corp., St. Joseph, Mich.; Dave Hays, late of General Electric; G. I. Cockerill, Apex Electrical Mfg. Co., Cleveland; W. F. Oliver, Bendix Home Appliances, Inc., South Bend, Ind.; N. L. Etten, Chamberlain Corp., Waterloo, Iowa; Frank Breckenridge, Automatic Washer Co., Newton, Iowa, and P. Eduard Geldhof, 1900 Corp.*

Yardstick for a whole industry, a "comparator" washing machine and a test procedure perfected by the engineering standards committee of the American Washer and Ironer Manufacturers' Association have been placed in use by the organization's various members.

Any household washer manufacturer now can determine the relative efficiency of the appliances he produces, as compared to competitive lines.

The committee, headed by P. Eduard Geldhof, vice president and chief engineer of the 1900 Corporation, St. Joseph, Mich., worked two years codifying the standard tests.

For the first time, every member of the industry now possesses authoritative means for gauging the service his washers perform for the consumer.

The "comparator" washer is a special model made available to all manufacturers but not available to the public. Standard cloth, soiled by a standard method, is given a standard washing. Every detail of the soiling and the cleansing is specified in the test procedure prepared in many sessions of the Geldhof committee. After the washing, the light-reflecting properties of the cloth are compared, by scientific test, to the same properties of un-soiled "control" cloth. The more closely the washed cloth comes to the light-reflecting ability of the clean cloth, the better the washing operation has been.

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### AMA Packaging Exposition to be held in Philadelphia, April 8-11

A return to major emphasis in sales plans on the style and materials of the package is foreseen by Alvin E. Dodd, president of the American Management Association, in announcing the sixteenth annual AMA Packaging Exposition sponsored by the association to be held in Convention Hall, Philadelphia, April 8-11.

The AMA conference on packaging, packing and shipping will be conducted concurrently with the exposition.

The exposition, largest in its history, will occupy 80,000 square feet, with approximately 150 exhibitors displaying machinery, equipment supplies and services. Trade attendance last year was in excess of 10,000.

"Although material shortages and unfilled consumer demands have maintained the 'seller's market' in most industries up to this moment, the prospect of almost immediate changes in product availability and customer psychology requires a reappraisal by management of its packaging approach," Mr. Dodd said.

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### Eastern enamelers February meeting

The next meeting of the Eastern Enamelers Club is scheduled for February 15, at the Ritz Carlton Hotel, Philadelphia. The program committee promises an interesting and instructive program, and suggest that there are several important matters of club business to be discussed at this meeting.

Speakers include R. F. Bisbee, manager of quality control, Westinghouse Electric Corp., who will talk on "Reduction of Shipping and Field Losses Due to Breakage," and Floyd Woleslagle, market development division, Carnegie-Illinois Steel Corp., who will talk on PEI market research for 1946 and present a slide film "Porcelain Enamel Preferred."

Luncheon is scheduled for 12:00.

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### A.C.S. Pittsburgh section February meeting

The Pittsburgh section of the American Ceramic Society will be host to W.E.S. Turner at the February meeting to be held Tuesday, February 11, at the University Club, according to J. S. Nordyke, secretary.

Professor Turner, professor emeritus of the University of Sheffield, England, and visiting professor of glass technology at the University of Illinois, will speak on the electric melting of glass.

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### New "water conditioning" company formed

Process Equipment Corporation is the name of a recently formed Chicago concern which will specialize in water conditioning. The new corporation is headed by P. B. Carter, Jr., formerly secretary and treasurer of Illinois Water Treatment Company, Rockford, Illinois.

According to Mr. Carter, his organ-

**BEFORE Trying OHCO Oxide Service**

**AFTER Using OHCO Oxide Service**

Keep yourself out of "hot spots" caused by headaches arising from mixing colors to a specified shade in your enameling plant. Color matching is a specialized field wrought with production dangers at every turn for the occasional color mixing enamelist. Matching and mixing colors can be best done by specialists with equipment and "know-how" to guarantee a perfect match and consistent uniform results. It costs no more.

Your color requirements can best be met by having OHCO Oxide Service supply you with uniform coloring oxides, graining paste, squeegee colors and paste free from production troubles.

**Laboratory Controlled Production of Ceramic Supplies**

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Pacific Coast Agents
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- FRIT for Steel, Cast Iron or Pottery
- CERAMIC COLORS
- CHEMICALS
- BRONZE POWDERS
- METAL POWDERS
- SUPPLIES
- EQUIPMENT

Our Technical Staff and Samples are available to you without obligation. Let us help you with your problems.

*World's Most Complete Ceramic Supplier*

ization will offer complete chemical and engineering service and manufacture equipment used for all types of industrial water conditioning.

### Hotpoint to display "kitchen planning" at Home Builders convention

Builders who installed 1,000 all-electric kitchens for war veterans' housing during 1946 under a special allocation made by Hotpoint will have an opportunity to see how Hotpoint institute planned their kitchens at the national association of Home Builders convention and exposition, Stevens hotel, Chicago, Feb. 23-27 inclusive.

A specially designed display, manned by kitchen designers who will make actual plans for visitors, will highlight the Hotpoint display at the exposition. Also included will be a complete all-electric kitchen and a home laundry.

Officials of Hotpoint announced that visitors will be presented with a package of kitchen planning information to assist them in setting-up planning departments in their offices or stores. This package will include a booklet explaining methods of financing these ensembles, as well as installation data.

The over-center snap action mechanism, an exclusive Robertshaw feature, is actuated by the expansion and contraction of liquid in the hydraulic assembly. The movement of the diaphragm thus created is concentrated on a snap-lever and becomes greatly magnified. Consequently, the control is very sensitive and responds quickly and accurately to maintain very close differentials. Sturdy and dependable, Robertshaw thermostatic electric controls are used widely by leading manufacturers of electric cooking and heating equipment.

**MODEL D1**

*General purpose, double pole, single throw control. No separate "off" switch needed. Capable of standing loads of 6000 watts, 250 volts.*

**MODEL C1**

*With automatic selector switch. Designed to control 2 elements either individually or simultaneously.*

Robertshaw models include thermostats for dressing sterilizers, autoclaves, incubators, electric and oil ranges, ovens, water heaters, laundry machines, deep-fat fryers, coffee urns, food carriers, chicken brooders and many other uses.

*Write for full information about the line and special engineering service.*

## Industrial literature

### Technical data on springs

Third edition of a *Handbook of Technical Data on Springs*, this 36-page booklet offers clear, concise data on such subjects as design formulation, load deflection, and the proper methods of specifying springs. Several helpful short cuts for making spring calculations are also presented. All engineers and designers who use springs should find the handbook very valuable.

Copies may be obtained free of charge by writing Accurate Spring Mfg. Co., 3811 W. Lake St., Chicago 24, Ill.

### Pemco issues new price list

The Pemco Corporation has just announced the release of a new price list which became effective January 1, 1947. Pemco says this new price list is a continuation of a policy followed prior to the war — to issue a price list quarterly for the convenience of buyers of porcelain enamel frit, colors and mill additions. It also includes material and equipment used generally in plant operation. This new list is pocket size, with a flexible cover bound in plastic. In addition to all prices on Pemco material and equipment, the list includes several pages of technical data.

### Tramrail systems

A 10-page booklet by the Forker Corporation, manufacturers of Ohio Tramrail Systems, includes handling tools for many types of products plus a variety of ceiling conveyors.

### Book on new Trade Mark Act

W. H. Anderson Company, law book publishers of Cincinnati, Ohio, announce the publication this week of

the first book on the new trade-mark act — "Trade-Mark Act of 1946", by H. A. Toulmin, Jr., of Dayton, Ohio. (Price delivered single copies $5.00; 10 or more copies $4.00 each).

This act, known as the Lanham Act, is the first comprehensive law enacted for the protection of trademarks in the United States. It was advocated for years by the National Association of Manufacturers, Association of National Advertisers, Inc., and the patent committees of various bar associations.

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**Cutting tool materials**

Publication of a new and informative booklet analyzing impartially the comparative fields of usefulness of high speed steel, cast alloys, and carbides as cutting tools, has been announced.

Entitled "Cutting Tool Materials," the brochure correlates comprehensively the basic characteristics, properties and functions of the three broad types of cutting materials, so their usefulness for specific requirements can be evaluated.

Copies free upon request to Allegheny Ludlum Steel Corp., 2020 Oliver Building, Pittsburgh, Pa.

## New Equipment

**New welders' speed-shift goggle**

One of the problems encountered by welders is said to have been solved by the introduction of a new speed-shift goggle mounted on a comfortable plastic headgear.

With ordinary goggles, shifting from eyes to forehead for layout and inspection is frequently a two-handed job, and means the welder must lay


Once

THROUGH IS ENOUGH!

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DE-IRONER

Slip — whether recovered or new — needs only one pass through the Dings De-Ironer for thorough cleaning by removal of iron particles. This "one-pass" separator has no secret mechanism . . . It is more powerful and does a better job simply as a result of an accurately balanced magnetic circuit having longer coil windings for greater magnetic intensity; and many more lineal feet of stainless steel grid area to catch and hold iron present in the slip. *Dings De-Ironers, size for size, have 20% to 30% greater capacity than any other separators of similar type.*

Write today for full information on the right Dings De-Ironer for low cost, "one-pass" magnetic separation in your plant.

**DINGS MAGNETIC SEPARATOR CO.**
4750 W. McGeogh Avenue
Milwaukee 14, Wisconsin

*De-Ironer Features:*

- 20% to 30% greater capacity, size for size, than any other magnetic separator of this type.
- Stainless steel grids—spot welded and heavily chrome plated.
- Open or pressure models available—can be operated top-to-bottom or bottom-to-top.
- Solenoid safety valve, with only one moving part, prevents slip contamination in case of current failure.
- Float valve insures complete coverage of grids while De-Ironer is working.

Coils wound for continuous "High Intensity" operation.

Dings
"HIGH INTENSITY"

*"Separation Headquarters Since 1899"*

down his tools to re-position his goggles. With the new Cesco Speed-Shift, a quick flip of one hand moves the goggles.

Further information can be obtained by writing the Chicago Eye Shield Co., 2300 Warren Blvd., Chicago 12.

### New ultrasonic materials tester

A new ultrasonic materials tester designed to indicate the presence of voids, cracks, porosity, laminations, poor bonds, and other internal flaws in metals, plastics, and ceramics has been introduced by the Special Products Division of the General Electric Co. The tester is said to be useful in production testing of metal castings, forgings, or finished machined parts, as well as plastic or ceramic parts.

The new tester sends a beam of ultrasonic waves through the specimen being tested. Changes in the amount of energy transmitted through the specimen are an indication of the presence and extent of flaws. The tester is portable and self-contained, and provides a direct reading. Testing is not affected by small changes in dimensions or position of test pieces.

The instrument can also be used to indicate changes of viscosity of liquids, when these significantly alter the velocity or attenuation of ultrasonic transmission.

## News and personals

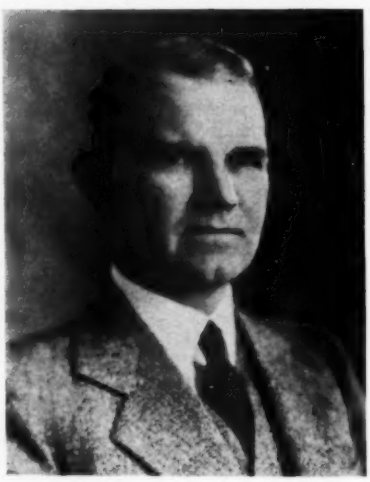
### Corrosion authority to Carnegie-Illinois

Appointment of Robert B. Mears as research laboratory manager in the research and development division of Carnegie-Illinois Steel Corp. has been announced. He succeeds E. S. Taylerson who recently became supervisor of engineering research for the company. Mears is author of more than 50 papers on corrosion and protective coatings.

### Gaffers leaves $290,000 estate

The late William C. Gaffers, 59, stove manufacturer and racing stable owner, left his $290,000 estate to his wife, Caroline, according to a will on file for probate in Superior Court. The income was estimated at $22,000 a year. Gaffers died December 28.

### Todd outlines steel situation



At the recent stove meeting in Cincinnati, R. C. Todd, vice president of American Rolling Mill Co., gave a concrete outline of the current situation with regard to the supply of steel sheets before several hundred stove company executives. Read his article, "The Sheet Steel Outlook for 1947," on page 25 of this issue of *finish*.

### Cerametalics, Inc.

Edward J. Barrett, Secretary of State of Illinois, recently granted a charter to Cerametalics, Inc., with offices in the Lincoln Building, Champaign, Illinois.

The new corporation will specialize in the development, research, manufacture and application of protective coatings and heat resistant bodies composed of ceramics, metals, organic materials, or combinations. New Cerametalic coatings are designed for the preservation of metallic parts exposed to high temperatures and corrosive atmospheres as experienced in the aircraft industry and commercial fields.

Directors of the corporation are: D. W. Martin, formerly in the Ceramic Department, Experimental Engineering Div., Wright Field, Ohio; Prof. D. G. Bennett, J. E. Comeforo, T. F. Newkirk, W. J. Plankenhorn of the Department of Ceramic Engineering at the University of Illinois; Dr. G. A. Bole, A. R. Blackburn, E. T. Montgomery of the Ceramic Department of The Ohio State Research Foundation.

### Pioneer heater manufacturer inaugurates second century

Established in 1846, the Ohio Foundry & Manufacturing Company of Steubenville, Ohio, now embarks on its second hundred years in the manufacture of heating appliances. The firm, specializing in a full line of manual and automatic space heaters for all types of gas, announces several changes in personnel affecting its technical and production staffs. Announcement was made by George H. McFadden, president and general manager.

Charles J. Grayson, plant manager and vice-president, has resigned from active duty because of ill health. He will continue to serve the company in a consulting capacity.

Alex B. Sharpe, great-grandson of the company's founder, has been advanced to the post of plant manager. Mr. Sharpe served as a U. S. Marine Corps officer in the Pacific Theatre through the War.

Added to the firm's technical staff as chief engineer is Harry E. Thompson, formerly with A. G. A. laboratories and more recently with Peerless Manufacturing Corporation.

### R & M appoints W. Y. Hill

R. S. Agee, vice president of Roberts & Mander Corporation, Hatboro, Pa., announces the appointment of William Y. (Bill) Hill as district sales representative for New York state. Mr. Hill's territory will include all of New York state except Westchester County, Long Island, and the Metropolitan New York area.

Hill started in the "Quality" sales organization in 1937.

### Golden, Florence vice president, dies in Florida

Harvey E. Golden, vice president of Florence Stove Co., died at New Smyrna Beach, Fla., on January 8, as a result of a heart attack. He was

*to Page 60 (Column 3)* →

# Put DOLLARS in your pockets with CENTURY frits

PLANTS that learned about Century time-proved frits during 1946 have more "dollars in their pockets" today as a result. Customers who have used Century enamels year after year can show a nice fat saving in enamel plant operating costs — that's why they continue to use them year after year.

Sure, they are priced right to start, but there are "in plant" savings that count up fast. Century ground coat enamels give the grip, the durability so important to your product, and they are easy and economical to apply. Century cover coats produce the finishes you can sell with confidence and produce them without extra fuss or special handling in the plant.

Make a note to arrange for a trial of Century frits before another month rolls by. Then, by the end of 1947 you will agree with us that Century frits "put dollars in your pockets."

***(Century ground coats are a "life saver" in plants forced to use non-enameling sheets during the present critical steel situation.)***

**FRIT from CENTURY**

**FRIT MASTERS**

**CENTURY VITREOUS ENAMEL COMPANY, 6641-61 S. Narragansett Ave., Chicago 38, Ill.**

## The Washington round-up *(Continued from Page 33)*

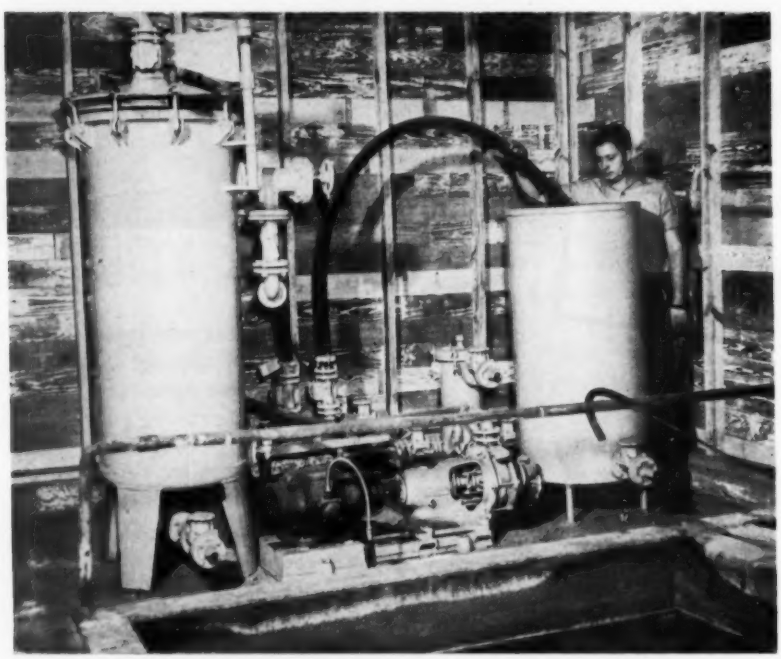
proposed under a previous plan. Under the new plan a smaller plant was considered adequate by Lustron, and the company requested the Office of the Housing Expediter to assist it in acquiring the Douglas plant at Chicago, now being used for storage purposes by the Army Air Forces. Mr. Creedon said his office is considering the plan and is investigating the availability of the Douglas plant.

### Soda ash supply may improve

Soda ash production remains about 15 per cent short of requirements across the board. While CPA controls the situation with priority and allocation powers which may be used if producers do not supply the aluminum plants, particularly the Henry Kaiser Permanente plant, other consumers may expect curtailed supplies. However, when controls go off March 31, it is considered probable that some of the northern producers now supplying the southern aluminum plants will terminate shipments to that area, unless controls are renewed by Congress. This does not seem likely, in which case supplies of soda ash will be increased to historical customers. Henry Kaiser is understood to have started construction of facilities to produce his own soda ash. However, this will not immediately relieve the situation, as construction will not be completed for some time.


# GET TOP EFFICIENCY

## IN YOUR PICKLE ROOM BY USING *INDUSTRIAL* PRESSURE FILTERS



A typical Industrial Filter installation in the pickle room at Ingram-Richardson Mfg. Co. of Indiana, Frankfort, Indiana.

**Save time, save money, and keep your new pickle room at top efficiency. Include Industrial pressure Filters in your plans for a modern plant. Send for specifications on a unit to meet your requirements for a dependable clarification and purifying system.**

**Made in a range of sizes and capacities, both portable and stationary, they offer the convenient and labor saving method of filtering nickel or neutralizer solutions.**

**Automatic Filter powder feeders, special alloy pumps, Filter cloth and Filter Aids**

**INDUSTRIAL FILTER & PUMP MFG. CO.**
1621 WEST CARROLL AVENUE • CHICAGO 12, ILLINOIS


### Enameled products shipments

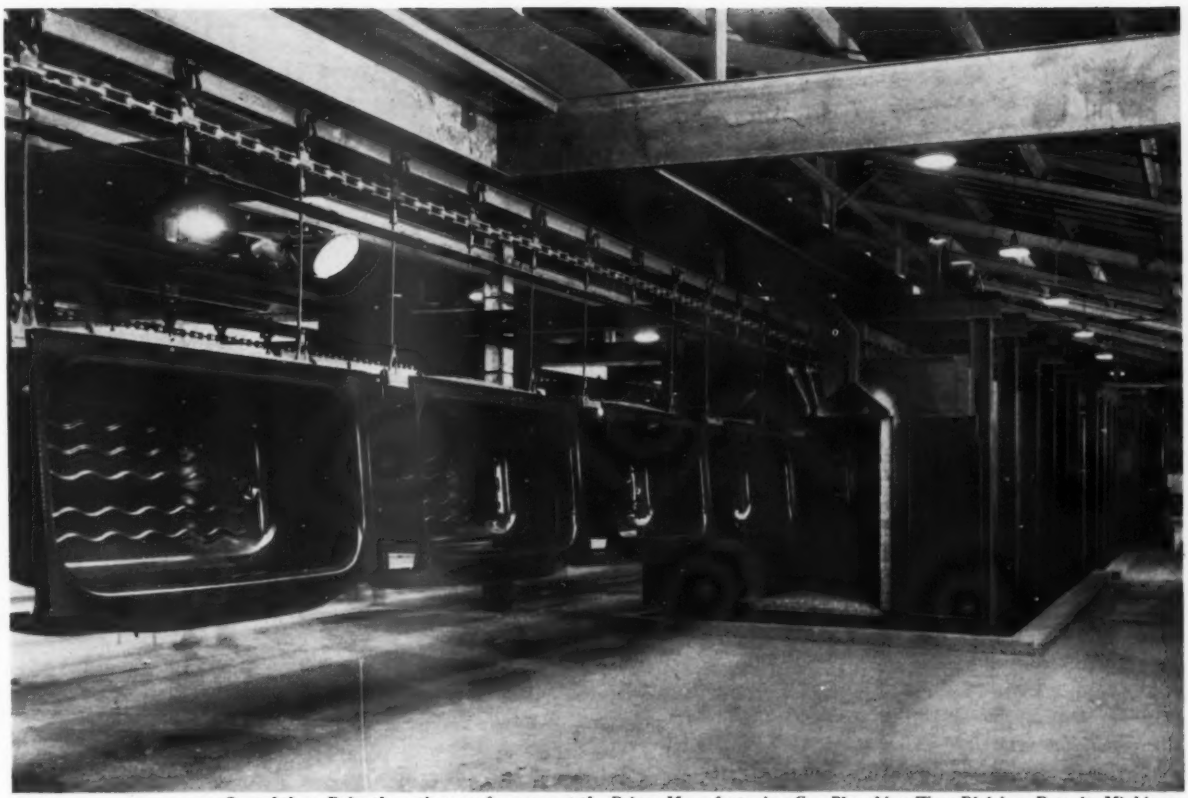
Shipments of porcelain enameled products dropped slightly from $8.1 in October to $7.8 million in November, according to the Department of Commerce. Shipments of cooking, household, and hospital utensils accounted for $2.8 million, or 36 per cent of the total November shipments.

The November production report:

| | |
|---|---|
| Signs | $391,818 |
| Stove parts (sold as such) | 696,738 |
| Refrigerator parts (household and commercial) | 512,025 |
| Reflectors, including fluorescent reflectors | 392,995 |
| Cooking, household and hospital utensils | 2,799,362 |
| Table tops (kitchen cabinets, etc.) | 585,994 |
| Store fronts and other architectural parts | 175,869 |
| Washing machine parts | 666,325 |
| All other | 1,593,008 |

### Government report on borax replacement material

The Office of Technical Services, Department of Commerce, has on sale a report on the use by the Germans of a vitrified sodium titanium silicate flux for borax and boron compounds during the war. The report which was prepared by C. J. Harbert, an OTS investigator, terms the German flux "a truly remarkable development" since prior to 1939 in Germany it had been assumed that frit formulas were unworkable if they did not contain 10 to 20 per cent boron compounds. The Germans were unable to get borax after 1939. The flux is regarded by I.G. Farbenindustrie, in a handbook appended to the report, as an entirely new raw material rather than a wartime substitute. The authors state that the flux known as V-26 can make European enamel works independent of borax. Advantages of the flux are said to be that it melts without loss, is soluble in water, and has a softening point of 470° C.



*One of three Boland continuous furnaces at the Briggs Manufacturing Co., Plumbing Ware Division, Detroit, Michigan.*

# BOLAND "SINGLE FLOW" FURNACES

## Are Built for Heavy Production Loads

**If your problem is bathtubs or other heavy gauge parts, you can depend on a Boland SINGLE FLOW. If your problem is the production of light weight signs or other thin gauge products, you will find this furnace equally effective.**

**The BOLAND continuous furnace provides radiating surfaces on both sides of the ware, and has a pre-heat zone that raises temperature gradually, firing ware the way it should be fired.**

**And here's another advantage you will get in no other continuous furnace — the Boland FLOATING ROOF construction (Boland Patent No. 2,156,008).**

**This roof, "built like Gibraltar," minimizes heat loss and prevents conveyor distortion. Here's a roof that "carries its own weight" and is built for long life.**

**And, don't forget that in the Boland STRAIGHT AWAY, SINGLE FLOW furnace you get heavier payloads as a result of the wide radius conveyor turns characteristic of the SINGLE FLOW furnace.**

---

## ALBERT J. BOLAND COMPANY

**407 NORTH EIGHTH BUILDING • ST. LOUIS 1, MO.**

***Designers and Builders of Continuous and Box Type Enameling Furnaces***

## At the Chicago markets

*(Continued from Page 27)*

all with porcelain enameled tubs, including Automatic, Duchess, Horton, Blackstone, Barton, Speed Queen, etc., etc.

The stove industry was well represented. Caloric had a new and elaborate display with its best looking range yet.

Estate showed a home freezer in companion design to the Estate range. The new freezer, with porcelain enameled top (standard cabinet height), is designed to take its place in the kitchen lineup.

Roper's new eight-burner range offered an exceptionally clean looking top with white porcelain enameled burner bowls forming a part of the top.

Other range exhibits included Cribben and Sexton, with a revolving exhibit; and Crown Stove showing a "dinette" two-burner range with oven.

Tappan featured the visible oven, and Gibson presented a new design note in electric range bodies.

One of the most elaborate displays at the Furniture Mart was that of Admiral Corporation.

Frigidaire ranks high in its current refrigerator models for their conservative smartness.

Roberts and Mander exemplified the blue ribbon quality of their ranges by carrying out the blue ribbon idea literally.

Among the "complete kitchens" review were those of Kelvinator, Presteline, Westinghouse, Crosley and General Electric. Crosley was showing porcelain enameled double-drainboard sinks over modern steel cabinets.

At the Merchandise Mart we viewed the displays of most of the porcelain enameled holloware producers, including U. S. Stamping, Moore Enameling, Lisk-Savory, Polarware, Fletcher Enamel, Vollrath, Belmont Stamping, etc.

Hotpoint featured a new eight cubic foot refrigerator "using the floor space of a six cubic foot." In addition to the porcelain enameled interior it has a vegetable freshener, fruit freshener and a meat compartment, all in porcelain enamel. And what's more, they call attention to the "acid resisting porcelain enamel" with appropriate labels.

Another Hotpoint feature was the porcelain enameled sink with built-in cabinet dishwasher. Dishwasher interiors are of stippled white porcelain enamel. A free standing model has porcelain enameled top and back splasher also.

The Florence Stove Company, in addition to gas, electric and oil ranges, showed an attractive line of modern, all-porcelain enamel, oil-fired room heaters.

Mutschler Bros. showed an attractive line of kitchen furniture; and Swartsbaugh Manufacturing a colorful and smartly designed roaster with porcelain enamel insert.

Substitutes were in evidence for some porcelain enameled products such as table tops, where the shortage of steel has cut deeply into sources of supply. In most fields substitutes for porcelain enamel have found "tough going" and it would appear that the road may get rougher with increasing demand for "quality" on the part of household product buyers.

## Washer ironer men meet

*(Continued from Page 35)*

offers an opportunity for industry members to introduce their products to many hundred thousand home economics pupils.

William Shaw, the industry's public relations consultant, discussed the practical application of the manual to the problem of dealer-manufacturer cooperation in equipping the schools; revealed that the country's farms, the last great unexploited promotion area for appliances, are being electrified at the highest rate in history; and announced that magazine and newspaper editorial support of the home laundering cause reached new highs in 1946.

The Association adopted unanimously a vote of thanks given Louis C. Upton, head of the Nineteen Hundred Corporation, outgoing president, and the other retiring members of his administration, as presented by John M. Wicht, vice-president, Blackstone Corporation, Jamestown, N. Y.

An interested spectator was T. W. Roberts, top executive of Vactric, Ltd., London, a prominent manufacturer of vacuum cleaners and now beginning the production of household washers in collaboration with the Apex Electrical Manufacturing Co., Cleveland.

### Willner, on the steel situation

The shortage of sheet steel will continue until "some time early in 1948," in the belief of Benton J. Willner, assistant vice-president, Inland Steel Co., Chicago, who addressed the meeting.

Expansion programs in the steel industry which, it was anticipated, would be completed by the middle of 1947, were delayed mainly through strikes in the electrical industry, pushing back the completion of the work to late this year or the first part of 1948, Mr. Willner asserted.

"We are entering the year 1947 with a very marked scrap shortage, and also a labor shortage, particularly with respect to unskilled and semi-skilled labor," said Mr. Willner.

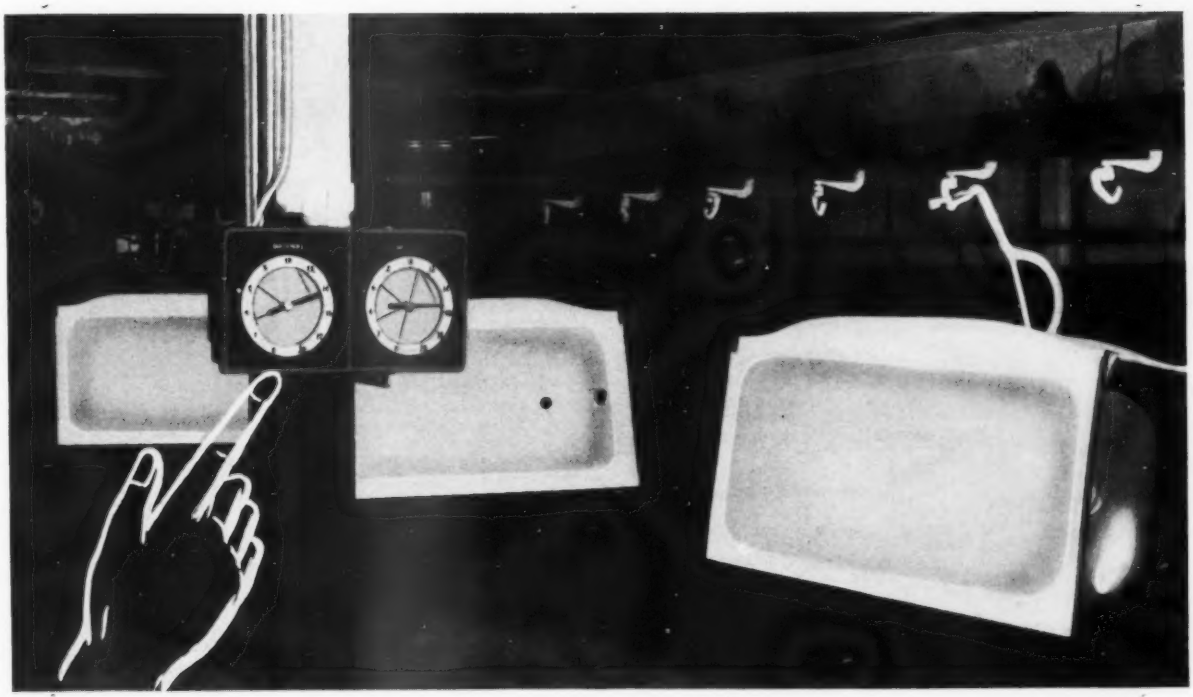
### New association executives

New vice-presidents are J. C. Nelson, chairman of the board, Easy Washing Machine Corp.; C. G. Frantz, president, Apex Elec. Mfg. Co.; and Oscar A. Lenna, president, Blackstone Corp.

New Association executive committee members are: E. L. Farquharson, sales manager, home laundry division, Landers, Frary & Clark, New Britain, Conn.; C. E. Anderson, manager, home laundry equipment division, General Electric Co., Bridgeport, Conn.; and H. Paul Nelligan, president, Easy. Holdovers are George Castner, general manager, Beam Mfg. Co., Webster City, Iowa; Judson S. Sayre, president, Bendix Home Appliances, Inc., South Bend, Ind.; and H. A. Sperlich, president, Ironrite Ironer Co., Mt. Clemens, Mich.

Bernard J. Hank, president, Conlon Corp., Chicago, was re-elected treasurer.

John Inglis Co., Ltd., Toronto, and Little Giant, Inc., Hayward, Calif., were elected active members and the small motors division of Westinghouse Electric Corporation, Lima, Ohio, was elected an associate.



# They CONTROL ENAMEL FIRING

## To Standardize Quality

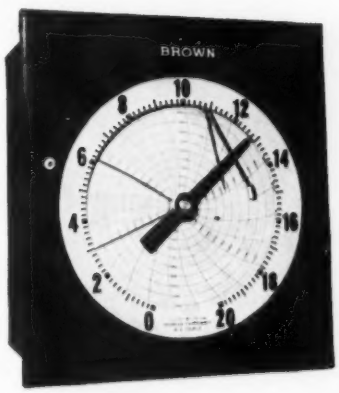
AT THE Briggs Manufacturing Company, of Detroit, Mich., Brown ElectroniK Potentiometers control the temperatures of porcelain enameling furnaces. Every Briggs Beautyware bathtub traveling through the furnace gets the same firing treatment, resulting in a standardized quality of flawless porcelain.

Brown ElectroniK Potentiometers operate on the "Continuous Balance" principle, which makes use of an electronic unit to detect the slightest change in process temperature. Corrective control action is immediate — and ruinous temperature cycling is eliminated. Because of a minimum of parts (which move only at a temperature change) they require a minimum of maintenance. They are rugged, unaffected by vibration, and can be depended upon to return years of trouble-free service.

Let us show you how Brown ElectroniK Potentiometers can help in maintaining the quality of any product when positive temperature control is a decisive factor. Write for Catalog 15-4R. THE BROWN INSTRUMENT COMPANY, a division of Minneapolis-Honeywell Regulator Company, 4411 Wayne Avenue, Philadelphia 44, Pa. Offices in all principal cities.

TORONTO, CANADA
STOCKHOLM, SWEDEN

LONDON, ENGLAND
AMSTERDAM, HOLLAND

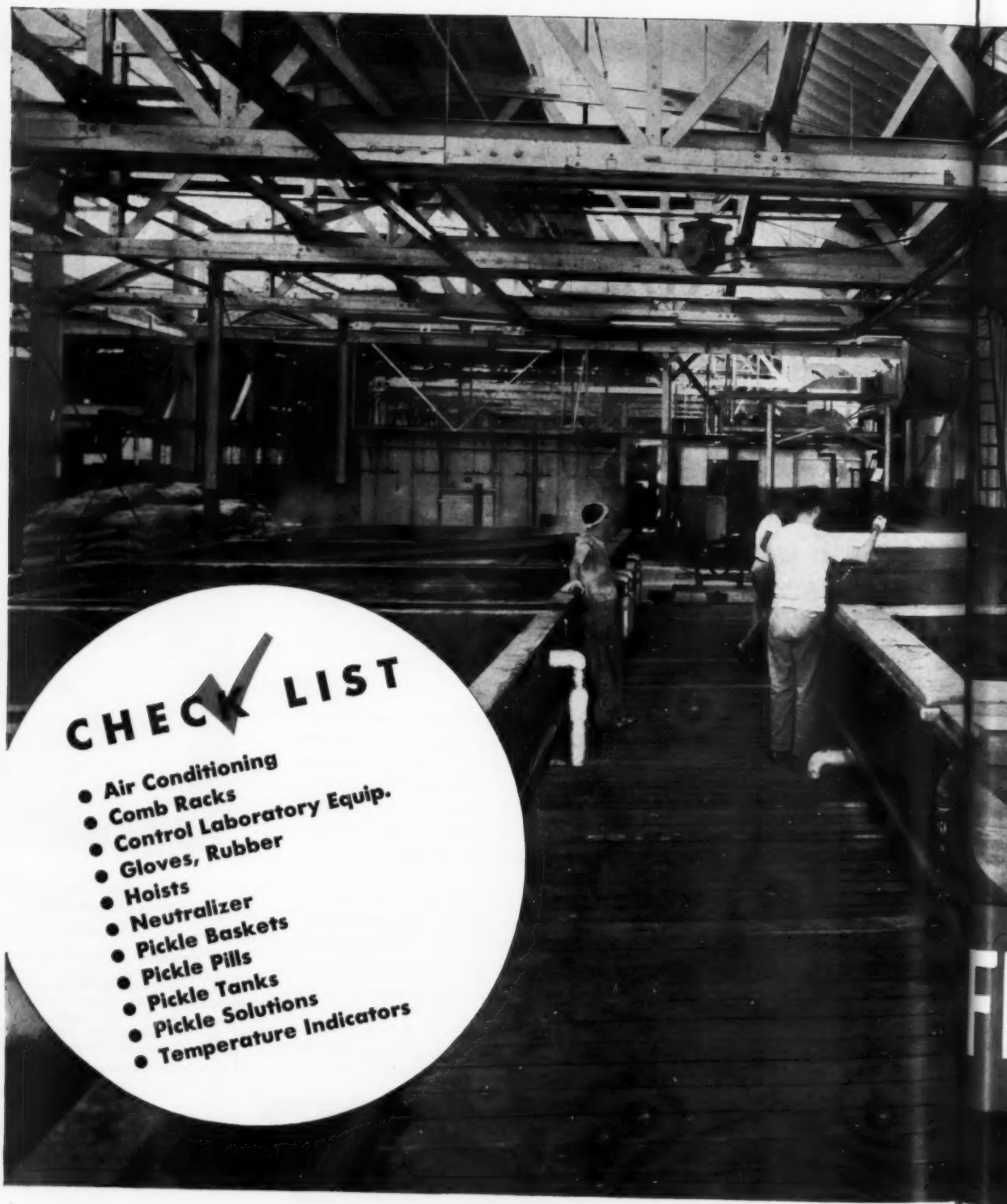



Brown *ElectroniK* Potentiometer
Electric Control Type

Operating from offices in all principal cities, Brown engineers travel throughout the length and breadth of the country. The Brown engineers in your locality will be glad to advise you without obligation on any control problem.

BROWN *Electronik* POTENTIOMETERS

# HAVE YOU LOOKED AT YOUR PICKL



LOOM . . . *Objectively?*

A number of *mighty* important improvements are now available—improvements that increase production . . . provide more accurate control . . . reduce operating overhead—all important in view of today's steadily rising production costs.

Perhaps you may also want to take a good look at—in fact, *check* and *double check*—the basic materials you are now using and evaluate them by today's new and higher standards.

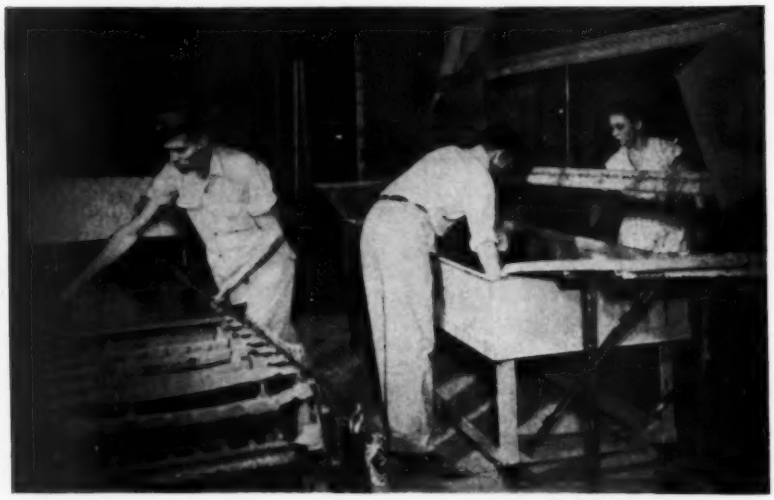
Whether yours is a standard or automatic pickling installation, we suggest you look it over objectively. Then call us in! You'll find we have what it takes to help you. Remember, Ferro is headquarters for complete pickle room equipment and supplies . . . as well as for engineering and new process development.

FERRO ENAMEL CORPORATION
4150 EAST 56TH STREET
CLEVELAND 5, OHIO

## QUICK TRIPS TO ENAMELING PLANTS . . . .

### A visit to Columbus Porcelain Metals Corporation

*(Continued from Page 28)*



*Above: Ground coat dipping. Pickled ware is fed from the right, and operator at left transfers ware from drain rack to drier conveyor.*

*Center: The "working" men of the Columbus Porcelain organization. Left to right, they are: Gordon Lasiter, John Scott, Hugh Scott, Bud Lasiter, Bob Lewis, George Zelinski.*

*Below: Spraying cover coat on stove parts. Helper at right feeds spray booth. Operator at left inspects and handles any required stoning.*

finishfotos

lined water tanks were being run.

#### A "family" plant

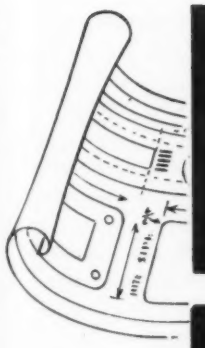
This is in every sense a "family" operated plant. The six principals, plus the wives of four, do all of the plant operations while the remaining two wives handle housework and do all of the cooking for twelve adults and five children. *(Note: Four of the principals are still searching for suitable houses or apartments.)*

In this plant you may see the president dipping ground coat or burning white; the vice president, pickling ware or spraying; and so on down the line. This is what we would term "super experienced" labor, as the accumulated enamel plant experience of the six men represents 84 years — and with the ladies included, 100 years.

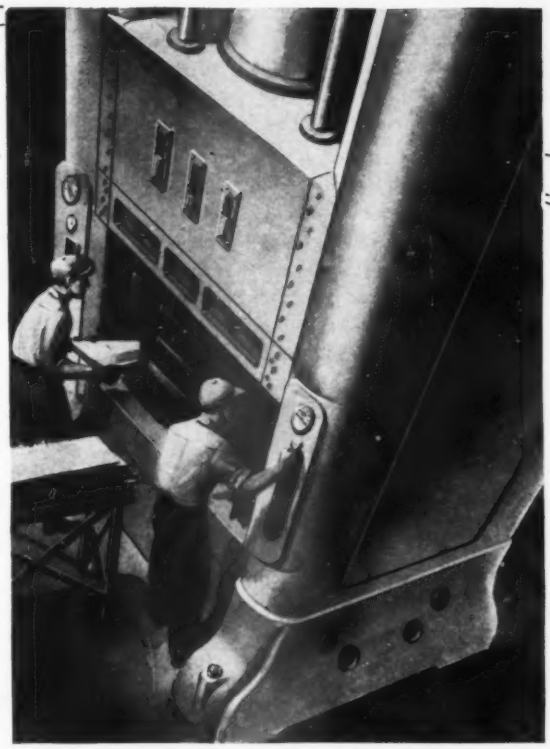
Said president Gordon Lasiter in commenting on the plant, "We have a capacity at present for parts for about 200 stoves per day. The plan is to start small and develop into a continuous furnace operation as the business and organization develops to warrant expansion."

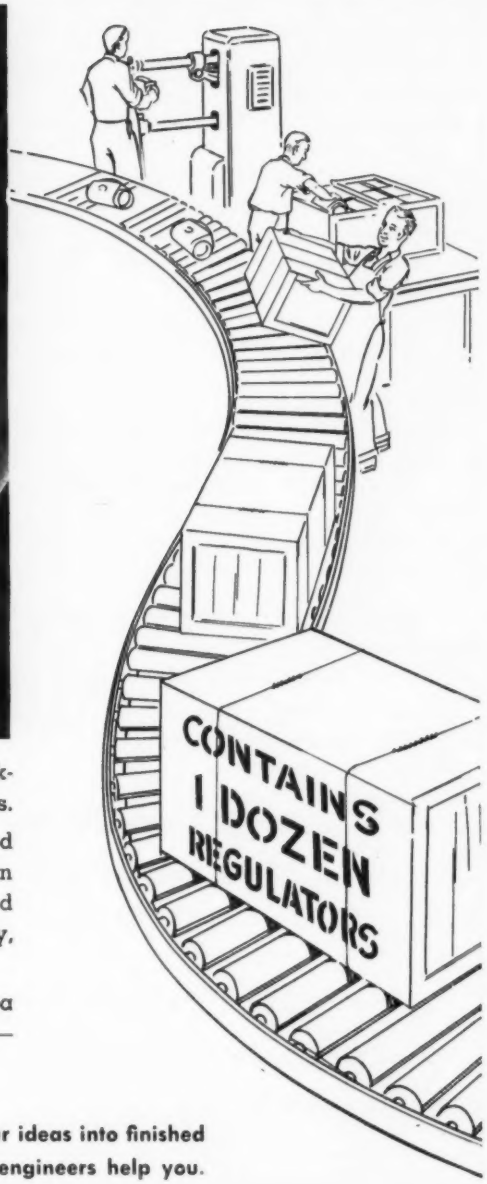
---

*A porcelain enameled dish pan doubles as a handy tub to rinse precious lingerie and hosiery. The completely smooth surface of the porcelain enameled dish pan is free of any dirt-catching crevices. This is important if there is any dyeing or silverware cleaning chore coming up.*



# FROM BLUE PRINT TO SHIPPING CARTON...
## *That's Monarch's Service*






For many years, Monarch confined its service to the making of Quality Dies, Jigs, Fixtures and Precision Stampings.

As business increased, new departments, each manned by highly skilled craftsmen, have been added; modern equipment has been installed and our facilities expanded to include Product Engineering, as well as Assembly, Finishing, Packing and Shipping.

If you have the materials, Monarch now offers you a most economical and complete steel product service — complete from blue print to shipping carton.

**For expert assistance in turning your ideas into finished metal products, let New Monarch engineers help you.**

MONARCH QUALITY

*When you think of Stampings, think of*

**NEW MONARCH MACHINE & STAMPING CO.**

406 S.W. NINTH STREET — DES MOINES 9, IOWA

## The sheet metal outlook for 1947

*(Continued from Page 25)*

Lakes tied up ore shipments and put a further crimp in steel production, which may carry over into 1947.

Much of the new pig iron and ingot capacity installed between 1940 and '45 cannot be fully utilized at present. A sizeable share of it is still owned by the Government. Several million tons of the increase was in electric furnace capacity, some of which is not economical to use.

Other reasons for present inability to utilize a portion of this increase are: unfavorable plant location, character of producing units, lack of proper finishing equipment, shortages of coke, and shortages of railroad equipment.

Based on these handicaps, and assuming freedom from more strikes, the industry will be doing well to produce 83 million tons of ingots in 1947 (compared with 67 million tons in 1940). Production could be higher if some of these difficulties are cleared up and demand continues high, but that estimate would drop if we are faced with another series of strikes in steel and coal.

### Factors affecting the "hard goods" picture

Let us look briefly at what has happened to the rest of our economy.

Since 1940 the national income has increased more than 100% and consumer savings have increased almost 250%.

During the same period our population has increased 7% and the number of families has increased 10%.

These facts, coupled with a four year drought in durable goods production, have brought about a terrific backed-up demand for "hard" goods of all kinds. Normal pipe lines from manufacturer to consumer were empty, and demands for steel are based both on current demand (which is most abnormal) and the necessity to fill inventory channels.

To this picture was added a new factor which caused some distortion in the prewar pattern of shipments.

To take care of our growing population, rapid increases in family formation, and the need for veteran's housing, it was of primary importance that an abnormally high percentage of available steel should first be consigned to the needs of home building, household appliances, and other necessities. This, according to the records, has been done.

It was only in the third quarter of 1946 that the steel and fabricating industries had comparative freedom from strikes, so the unit production figures for that period were used for comparisons to show what might have been the annual rate under the most favorable circumstances.

While we do not have comparable statistics for all steel-consuming products, the tabulation helps to indicate some of the distortions in present rates of production for durable goods.

### More reasons for distortions in sheet capacity

Mention was made previously of the fact that no increases in sheet or strip capacity were allowed during the war. There were also reasons why capacities for certain grades were distorted at the end of this war.

For example, during recent years, costly hand mills had to be dismantled, thereby reducing capacity for hot rolled sheets.

In our own company, one of our older mills was torn down during the war to make way for shell case production. Another one was sold to one of the aluminum producers to increase capacity for sheet aluminum, needed so desperately for military aircraft production. We have also found it necessary to make shifts between plants in setting up our production pattern and this has brought changes in capacity.

Undoubtedly similar situations have happened like this among all of the steel companies. Prior to 1941, a great part of the tin plate production was from hand mills and prac-

**New cold rolled sheet capacity**

| | Time Available | Tons |
|---|---|---|
| National Steel, Ecorse | 2nd Quarter, 1947 | 500,000 |
| National Steel, Weirton | " " " | 440,000 |
| Jones & Laughlin | " " " | 440,000 |
| Granite City Steel | 3rd Quarter, 1947 | 300,000 |
| U.S. Steel, Columbia | " " " | 400,000 |
| | | 2,040,000 |
| U.S. Steel, Gary | 1st Quarter, 1948 | 500,000 |
| U.S. Steel, Birmingham | " " " | 140,000 |
| Inland Steel | " " " | 300,000 |
| Bethlehem-Sparrows Pt. | " " " | 440,000 |
| | | 1,380,000 |

**List of steel companies recently acquired by other concerns**

| Company | Acquired by | Capacity |
|---|---|---|
| Andrews Steel Co. Newport, Ky. | International Detrola Corp. Detroit, Michigan | 292,000 tons of sheets |
| Mahoning Valley Steel Co. Niles, Ohio | General Electric Co. Schenectady, N.Y. | 97,500 tons of sheets |
| Superior Sheet Steel Co. Canton, Ohio. | Borg-Warner Corp. | 198,000 tons of sheets |
| Apollo Steel Co. Apollo, Pa. | Detroit syndicate of 12 companies | 156,000 tons of sheets |
| Portsmouth Works of Wheeling Steel Co. | Kaiser-Frazer | No sheet capacity* |
| Total plus amount rolled for Kaiser-Frazer | | 743,500 tons |

*(Sheet bars produced at Portsmouth to be shipped to Wheeling Steel Corp.'s Steubenville Works for rolling.)

**VITRO**
ENAMELERS OXIDES

**VITRO**
CERAMIC CHEMICALS

**VITRO**
RESISTOR ENAMELS

**VITRO**
DECAL COLORS

**VITRO**
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**VITRO**
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**VITRO**
DRY PROCESS COLORS

**VITRO**
PORCELAIN MILLS

**VITRO**
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**VITRO**
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**WHAT'S IN THE NAME**
**"VITRO"**

**VITRO**
OPACIFIERS

- *QUALITY*
- *EXPERIENCE*
- *SERVICE*

**VITRO**
TITANE

COLOR SPECIALISTS FOR THE CERAMIC INDUSTRIES FOR OVER FORTY YEARS

THE VITRO MFG. CO. TRADE MARK PITTSBURG, PA.

**THE VITRO MFG. CO.**
Corliss Station, PITTSBURGH, PA.
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tically all was hand dipped. Shortage of tin necessitated the adoption of electrolytic deposit processing. This practice requires cold rolled sheets in coils and the very heavy demand for tin plate takes up a great deal of cold rolled capacity that might otherwise have been available for commodity cold rolled sheets as heretofore.

While the O.P.A. has had some responsibility for maladjustments of grade production, the degree to which they may have contributed to that end seems to me to be slight in comparison to the other factors mentioned.

Because of these many changes during the war years in plant facilities, there has been a very great distortion in grade production. A brand new factor to create further confusion and a greater distortion of grade distribution lies in the acquisition of steel companies by other concerns.

The old customers of these mills may now have to face a problem of developing new sources of sheet supply.

#### The future outlook

Based on this discussion it seems reasonable to conclude that the steel industry is doing everything possible to get out a maximum tonnage of flat-rolled steel.

In addition, the industry is building new rolling capacity as rapidly as manufacturers can furnish equipment.

The prospective increased production of cold rolled steel sheets during 1947 of 21,040,000 tons with a further increase of 1,380,000 tons scheduled for 1948 should reestablish an output in closer relationship to demand.

While this extra tonnage is needed right now, it should be a great satisfaction to all users that this additional tonnage will be available comparatively soon and that everything possible is being done by the steel industry to get it into production.

---

*Adapted for* finish *from a talk presented at the Institute of Cooking & Heating Appliance Manufacturers Convention, December 3, 1946.*

## The importance of constant supervision in a porcelain enameling plant

*(Continued from Page 20)*

at North Carolina State College. Greaves-Walker was a stern disciplinarian, as perhaps some of you know. My hours were from 6:30 A.M. to 6:00 P.M., so I can assure you my feet got tired at times. One afternoon he caught me getting a little rest, and he asked how the plant was going. I told him everything was swell. He came right back with the remark that anytime a superintendent thought things were going along fine, then it was the time to get on his feet, get moving around, for surely something was going wrong.

So throughout the years, I have remembered that incident, and many times I have started out to find something wrong. I have never failed to find it.

You might ask at this point, "Why be a superintendent or a foreman if one has to work so hard?" Well, good ones usually do not have to work hard all the time. *They train a good organization,* and I am sure that even in this post-war, labor-troubled era, it still can be done.

---

*Adapted for* finish *from a talk before the Eastern Enamelers Club.*

---

## Ceramic coatings for steel in high temperature service

*(Continued from Page 24)*

#### VII • ACKNOWLEDGEMENTS

The development of the new type coating through the stages of laboratory study, service tests and regular production was made possible by the cooperation of several agencies. The Navy Bureau of Aeronautics, Army Air Forces and Army Ordnance Department participated in the service testing of the new coatings in parallel with conventional types submitted by manufacturers. Several of the latter, and the Porcelain Enamel Institute, were instrumental in promoting the use of porcelain enameled exhaust systems and participated in arrangements for some of the comparative tests, especially by the Tank Automotive Center. In addition, a number of aircraft companies cooperated by making extensive tests of the new National Bureau of Standards coatings in direct comparison with conventional porcelain enamels.

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*This presentation is a condensation of a more detailed report published in the Journal of Research of the National Bureau of Standards.*

## Welding sheet metal for enameling

*(Continued from Page 19)*

plications where hydrogen-free deposits are mandatory.

What gives the variations in results when porcelain enameling welded assemblies? Why are some lots all right while others show a high percentage of defectives?

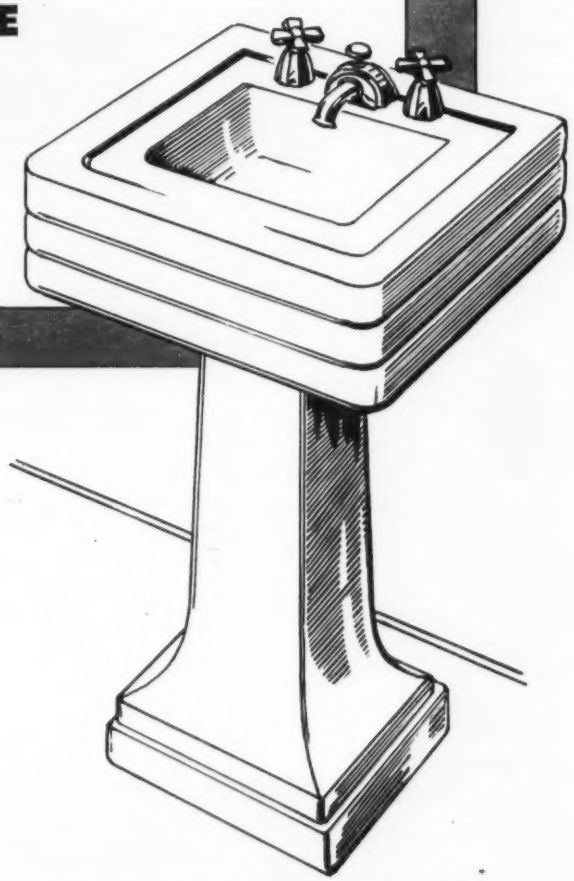
#### The hydrogen problem

Hydrogen is slowly evolved from the weld metal and the heat affected zone. During the first twenty-four hours after welding, gas evolution is rapid. Thereafter it takes place more slowly. Enough hydrogen should leave the assembly before enameling to enable the enameler to obtain a sound continuous coat; otherwise, spalling may occur.

Hydrogen evolution can be speeded up by heat treatment. Holding the parts at 700° F. for at least one hour ought to drive out all of the hydrogen. Stress-relieving, holding at 1150°F. for an hour per inch of thickness, also has been found practical.

Either aging at room temperature or heat treating may be uneconomical because of interference with the normal flow of production or because of added expenditures for labor and fuel. Where such conditions prevail,

# M&T SODIUM ANTIMONATE IMPARTS THESE FUNDAMENTAL ADVANTAGES TO ENAMELS



1. Uniform White Color
2. High Degree of Opacity
3. Greater Stability
4. Improved Luster

You can be sure of the right beginning to a bright finish for cast iron sanitary ware enamels when you use Metal & Thermit's Sodium Antimonate opacifier.

Exacting methods of manufacture—plus the most modern processing equipment—are an assurance of a uniform high quality opacifier capable of enhancing both the beauty and durability of enamels. A positive way to increase the saleability of your products.

*The facilities of our Ceramic Laboratory are available to assist manufacturers in getting the most effective results from our products.*

**METAL & THERMIT CORPORATION**
**120 Broadway, New York 5, N. Y.**

**CERAMIC DIVISION**

Arc Welding Electrodes

Tin

Ceramic Opacifiers

Industrial Chemicals

Thermit Welding

the initial welding can be done with lime ferritic electrodes which do not leave troublesome amounts of hydrogen gas in the weld regions. When E6015 electrodes are used, the weldments can be enameled as soon as the welds are ground.

Metallic arc welding is a rapid method for joining parts before porcelain enameling. Procedures and problems are simple to establish and work out. Costs are low. And, with modern techniques and materials, continuous and perfect enamel coats are possible.

---

*Numerical designations with prefix "E" refer to American Welding Society—American Society for Testing Materials electrode grades as given in AWS-ASTM joint specification A233-45T.*

---

### Jennings to promote gas kitchens

Appointment of Norval D. Jennings of Greenwich, Conn., as assistant director of the New Freedom Gas Kitchen Bureau of the American Gas Association is announced by H. Carl Wolf, managing director of the Association. He will assist H. Vinton Potter, director of the Bureau, in the national promotion of modern all-gas kitchen units.

A graduate of Yale University, Jennings has had extensive experience in domestic sales and promotion with Gulf Oil Corporation, Socony-Vacuum, Inc., and Talon, Inc. While associated with Socony-Vacuum, he was engaged in foreign marketing in England, Portugal and Africa.

### Ferro exhibits at stove convention

finishfoto

One of the exhibits representing the porcelain enameling industry at the recent Cincinnati convention of the Institute of Cooking and Heating Appliance Manufacturers was that of Ferro Enamel Corporation. The theme of the exhibit was carried out in the familiar Ferro check.

In addition to Ferro products, heating elements, switches and valves produced by Tuttle & Kift, Ferro subsidiary, were prominently displayed.


MASSEY-HARRIS, LTD.
Chooses
BURDETT
(The Original)
INFRA-RED
GAS
BURNER

DRY 4 COMBINES PER HOUR

Recently praised by Fortune Magazine for its extraordinary efficiency, Massey-Harris, Ltd., Toronto, has now installed two Salem Engineering ovens equipped with Burdett Infra-Red Burners, thus joining thousands who know . . . Burdett Infra-Red Burners save from 33⅓% to 76⅔% drying time.

This oven is 60′ x 15′ x 15½′, drying 4 combines, approximately 33,200 lbs. of steel, per hour at 190° F.

Floor conveyor speed is 1.7 feet per minute. These revolutionary results can apply to your drying, baking, cooking and similar processes. Ask for complete data.

3401 West Madison Street, Chicago 24, Illinois

BURDETT MANUFACTURING CO.
Infra Red Gas Burners



*At the end of many a rainbow—*

If you go to the end of a rainbow, so the fairy tales say, you'll find a pot of gold.

Of course no grownup believes this. But it's surprising how many people believe what amounts to the same thing.

That is, many of us have a dreamy notion that somewhere, sometime, we'll come upon a good deal of money. We couldn't say exactly how this might happen—but we go along from day to day, spending nearly all we make, and believing that *somehow* our financial future will take care of itself.

Unfortunately, this sort of rainbow-chasing is much more apt to make you wind up behind the eight ball than with a pot of gold.

When you come right down to it, the only sure-fire way the average man can plan financial security for himself and his family is through saving—*and saving regularly.*

*One of the soundest, most convenient ways to save is by buying U. S. Savings Bonds through the Payroll Plan.*

These bonds are the safest in the world. When you buy 'em through the Payroll Plan, they mount up fast. And in just 10 years, they pay you $4 back for every $3 you put in. They'll come in mighty, mighty handy when the time comes to send your kids to college, to buy a house, or to weather a rainy day.

So isn't it just plain common sense to buy every U. S. Savings Bond you can possibly afford? You bet it is!

**P. S.** You can buy U. S. Savings Bonds at any bank or post office, as well as at your place of business.

# A SIMPLE BAKING PROCESS GIVES LASTING PROTECTION

- ECONOMICAL
- DURABLE
- INORGANIC

Yes, KAYKOTE is easy to apply — just spray it like paint — then a simple baking process gives lasting protection. This new low temperature ceramic coating is applied like paint, but offers protection against corrosion impossible with ordinary finishes.

KAYKOTE will fight your battle against rust, corrosion, heat, impact, abrasion, scratch, acids and alkalis — and it will add eye appeal to your product, too.

If lasting protection is what your product needs, contact us at once for more information on this new type low temperature ceramic finish.

**We invite metal products manufacturers to submit articles to our laboratory to be KAYKOTED and returned to them with a complete report. Laboratory samples should not be larger than 12"x12"x48".**

Spray it
PROTECTION AGAINST CORROSION
**KAYKOTE**
LOW TEMPERATURE CERAMIC COATING
Dip it

**KAYKOTE DIVISION, KRAUS RESEARCH LABORATORIES, SPARKS, MD.**

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| 3" to 5" inclusive, per inch | 5.50 | 5.00 | 4.50 |
| 6" to 9" inclusive, per inch | 4.50 | 4.00 | 3.50 |

Measured in vertical column inches, columns 2¼ inches wide. Accepted in column inch multiples only. Add 25% for reverse plates.

### POSITION OFFERED

**WANTED . . .**

Los Angeles manufacturer with brand new factory and equipment wants man to handle screen process department. Must be able to get production and be familiar with all methods of screen making and application for porcelain enameled signs. Good opportunity for right man. In reply state fully your qualifications.

**California Metal Enameling Company**
**6904 East Slauson Avenue**
**Los Angeles 22, California**

**NEWS** → *from Page 44*

in Florida at the time convalescing from an attack of influenza.

As announced in January *finish*, Mr. Golden was recently elected vice president of Florence Stove Co., succeeding Henry H. Morse, retired.